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Journal of the Society of Arts.

FRIDAY, MARCH 27, 1863.

COMMITTEES OF REFERENCE.

The Committee on Agriculture met on Friday, the 20th inst., Sir Thomas Phillips, Chairman of the Council, in the chair. The Chairman invited the Committee to suggest subjects in connection with agriculture, including agricultural machinery and implements, tillage, drainage, manures, and new crops, to which the attention of the Society might advantageously be directed. Various subjects were then put forward by different members of the Committee, in respect of which it was considered the Society might usefully act, as well as others for which premiums might be offered by the Society, and it was arranged that a circular should be sent to each member of the Committee, inviting further suggestions in relation to the premium list about to be issued by the Society.

PRIZES FOR ART-WORKMANSHIP.

The Council have appointed a Committee, consisting of Messrs. John Bell, Bowler, Colin Minton Campbell, Henry Cole, C.B., J. G. Crace, W. Dyce, R.A., F. Elkington, C. D. Fortnum, George Godwin, F.R.S., Peter Graham, C. Hart, W. Hawes, W. Holland, M. D. Hollins, John Hunt, Owen Jones, Marsh Nelson, T. G. Parry, F. Pellatt, Sir Thomas Phillips, F.G.S. (Chairman of Council), Messrs. Richard Redgrave, R.A., R. Riviere, Skidmore, F. G. Stephens, Godfrey Sykes, J. Webb, and M. Digby Wyatt, to consider and report what prizes the Society should offer for the encouragement of art-workmanship applicable to manufactures, and, upon the recommendation of that Committee, the Council have decided to offer prizes for the successful rendering of designs in the undermentioned processes of manufacture, according to the directions detailed in each case. These will shortly be published.

1. Modelling in terra cotta, plaster, and wax.
2. Repoussé work in any metal.
3. Hammered work in iron, brass, or copper.
4. Carving in ivory.
5. Chasing in metal.
6. Enamel painting on metal, copper, and gold.
7. Painting on porcelain.
8. Inlays in wood (marquetry or buhl), ivory, or metal.
9. Engraving on glass.
10. Embroidery.

The designs will be by artists of great reputation, to be translated into the various modes of workmanship, and photographs and castings of such designs will be sold by the Society, at the

Society's House, at cost price, to persons desiring to be competitors.

The works to be executed will be considered to be the property of the producers, but will be retained for Exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

The exhibitors will be required to state in each case the price at which their works may be sold, or if sold previously to exhibition, at what price they would be willing to produce a copy.

The awards in each class will be of two grades, and the prizes specified in each class will be given, provided the works be considered of sufficient merit to deserve them; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

Before the award of prizes is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

STREET ILLUMINATIONS AND DECORATIONS.

The Council have appointed a Committee to consider and report what awards may be offered by the Society for practical suggestions to improve street illuminations and street decorations for *fêtes*.

SOCIETY OF ARTS EXAMINATIONS, 1863.—NOTICE TO LOCAL BOARDS.

The Previous Examinations by the Local Boards should be held forthwith, so that the Form 2 (see Programme) may be returned by the 1st April.

Any Local Boards expecting to have candidates desiring to be examined in Music, should apply to the Secretary of the Society of Arts without delay, who will furnish them with a form of test to be used at the Previous Examination in that subject, as explained in Par. 111 of the Programme.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.
SIR,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office

order or cheque, made payable to the Financial Officer,
Mr. Samuel Thomas Davenport, and crossed Coutts and
Co. I am, Sir, your obedient servant,
P. LE NEVE FOSTER, *Secretary*.

The subscription of each member is limited to
one guinea.

The following is the list of subscribers up to
the 26th inst. :—

Abbott, Major-General Sir Frederick, C.B.....	£1	1	0
Adams, Thomas.....	1	1	0
Adams, George G.....	1	1	0
Adams, George William.....	1	1	0
Addington, Right Hon. Henry Unwin.....	1	1	0
Adley, Charles Coles.....	1	1	0
Akroyd, Edward.....	1	1	0
Alger, John.....	1	1	0
Allen, Thomas.....	1	1	0
Allison, George.....	1	1	0
Ames, John.....	1	1	0
Anderton, James.....	1	1	0
Andrew, W. P.....	1	1	0
Asprey, Charles.....	1	1	0
Artingstall, George.....	1	1	0
Atkins, George James.....	1	1	0
Atkins, John P.....	1	1	0
Atkinson, William.....	1	1	0
Austin, James.....	1	1	0
Avery, Thomas Charles.....	1	1	0
Bacon, Jacob Perkins.....	1	1	0
Bagnall, Charles.....	1	1	0
Balleras, Guillermo Esteban.....	1	1	0
Barber, Charles.....	1	1	0
Barry, Dykes.....	1	1	0
Bartholomew, C.....	1	1	0
Bartlett, William E.....	1	1	0
Bateman, J. F.....	1	1	0
Baume, Celestin.....	1	1	0
Baylis, W. Henry.....	0	10	6
Bazley, Thomas, M.P.....	1	1	0
Beckwith, Edward Lonsdale.....	1	1	0
Belcher, Rear-Admiral Sir Edward.....	1	1	0
Bell, John.....	1	1	0
Bentley, Robert J.....	1	0	0
Best, Hon. and Rev. Samuel, M.A.....	1	1	0
Betts, Edward Ladd.....	1	1	0
Beyer, Charles F.....	1	1	0
Birkett, John.....	1	1	0
Bischoff, James.....	1	1	0
Black, Alexander.....	1	1	0
Blagden, George.....	1	1	0
Blaine, Delabere Robertson.....	1	1	0
Bookin, William Henry.....	1	1	0
Boileau, Sir John P., Bart., F.R.S.....	1	1	0
Bonnewell, William Henry.....	1	1	0
Bosanquet, George Jacob.....	1	1	0
Bowley, Robert K.....	1	1	0
Boyd, James.....	1	1	0
Brady, Frederick.....	1	1	0
Branstons, Robert Edward.....	1	1	0
Brassey, Thomas.....	1	1	0
Breillat, E.....	1	1	0
Brenner, Samuel.....	1	1	0
Brett, John W.....	1	1	0
Brickwood, John Strettell.....	1	1	0
Bright, Sir Charles.....	1	1	0
Broad, Robert.....	1	1	0
Brook, Charles.....	1	1	0
Brooke, Charles, F.R.S.....	1	1	0
Brooke, John.....	1	1	0
Brookes, William.....	1	1	0
Brooks, Henry.....	1	1	0
Browell, Edward M.....	1	1	0
Brown, Henry.....	1	1	0
Brown, Sir William, Bart.....	1	1	0
Browne, Edward.....	1	1	0
Budgett, John P.....	1	1	0
Burgoynes, Gen. Sir John F., Bart., G.C.B., } F.R.S.....	1	1	0
Burton, William S.....	1	1	0
Cama, M. H.....	1	1	0
Candy, Charles.....	1	1	0
Caplin, Madame R. A.....	1	1	0
Capper, Walter.....	1	1	0
Champion, Percival.....	1	1	0
Chance, Robert Lucas.....	1	1	0
Charlton, Henry.....	1	1	0
Chater Joseph.....	1	1	0
Chester, Harry.....	1	1	0
Christie, Robert Monro.....	1	1	0
Clabon, John M.....	1	1	0
Clark, Daniel Kinnear.....	1	1	0
Clutton, John.....	1	1	0
Cock, John, Junr.....	1	1	0
Coghlan, H. T.....	1	1	0
Cohen, Henry Louis.....	1	1	0
Cole, Henry, C.B.....	1	1	0
Colman, Jeremiah James.....	1	1	0
Cooper, William.....	1	1	0
Cope, Walter.....	1	1	0
Corbett, John.....	1	1	0
Corderoy, Edward.....	1	1	0
Cosens, Frederick W.....	1	1	0
Coulson, William.....	1	1	0
Courtauld, Samuel.....	1	1	0
Cowie, Thomas S.....	1	1	0
Creed, Henry.....	1	1	0
Critchett, Charles (Assistant Secretary).....	1	1	0
Cubitt, William.....	1	1	0
Cullingford, W. H.....	1	1	0
Cunningham, H. D. P., R.N.....	1	1	0
Curling, Joseph.....	1	1	0
Curtis, William.....	0	10	6
Crawford, Robert Wygram, M.P.....	1	1	0
Darby, Abraham.....	1	1	0
Davenport, Samuel Thomas (Financial Officer).....	1	1	0
Davidson, Thomas.....	1	1	0
Dawbarn, George.....	1	1	0
Dawbarn, Richard W.....	1	1	0
Dawbarn, Robert.....	1	1	0
Dawson, Henry.....	1	1	0
Day, William.....	1	1	0
Deane, Edward.....	1	1	0
Debary, Peter Francis.....	1	1	0
Dickson, Peter, F.R.G.S.....	1	0	0
Dilke, Sir C. Wentworth, Bart.....	1	1	0
Dilke, Charles W.....	1	1	0
Dillon, John.....	1	1	0
Dines, George.....	1	1	0
Dix, Thomas.....	1	1	0
Dixon, Thomas.....	1	1	0
Docker, F. W.....	1	1	0
Dowleams, A. M.....	1	1	0
Drax, J. S. W. S. Erle, M.P.....	1	1	0
Duncum, Charles.....	1	1	0
Dunn, Thomas.....	1	1	0
Dutton, William C.....	1	1	0
Eamsonson, Joshua J.....	1	1	0
Eastham, John.....	1	1	0
Easton, James.....	1	1	0
Easton, Percy Shand.....	1	1	0
Ebury, Lord.....	1	1	0
Elliot, William Henry Fletcher.....	1	0	0
Ellis, William.....	1	1	0
Ethelston, Rev. Charles Wick-tead, M.A.....	1	1	0
Evans, E. Bickerton.....	1	1	0
Evans, Jeremiah.....	1	1	0

Ewart, William M.P.	1	1	0	Horner, Edward	1	1	0
Faraday, Michael, D.C.L., F.R.S.	1	1	0	Horton, Isaac	1	1	0
Faulkner, John, Junr.	1	1	0	Horton, John	1	1	0
Fauntleroy, Robert Thomas	1	1	0	Howard, Philip Henry	1	1	0
Field, John	1	1	0	Howard, Thomas	1	1	0
Field, William	1	1	0	Imhof, Daniel	1	1	0
Fladgate, William Mark	1	1	0	Jackson, Richard M.	1	1	0
Foley, Lord	1	1	0	James, Jabez	1	1	0
Fordham, Thomas	1	1	0	James, Jabus Stanley	1	1	0
Foster, P. Le Neve (Secretary)	1	1	0	Jellicoe, Charles	1	1	0
Fowke, Captain Francis, R.E.	1	1	0	Jewesbury, H. W.	1	1	0
Fowler, Robert N.	1	1	0	Joel, Joseph	1	1	0
Fox, Sir Charles	1	1	0	Johnson, Henry	1	1	0
Freer, Rev. Richard Lane, D.D.	1	1	0	Johnson, Jabez	1	1	0
Fussell, Alexander	1	1	0	Jones, James W.	1	1	0
Gadesden, Augustus William	1	1	0	Jones, Owen	1	1	0
Garling, Henry	1	1	0	Jones, Richard Lambert	1	1	0
Geeves, William	1	1	0	Keeling, Herbert Howard	1	1	0
Gibson, Henry	1	1	0	Kelk, John	1	1	0
Gilbart, James William, F.R.S.	1	1	0	Kemp, George T.	1	1	0
Goding, Charles	1	1	0	Khazadar, S. E. le Général Moustapha, Pre- } mier Ministre de S.M. Tunisienne	1	1	0
Godwin, George, F.R.S.	1	1	0	Lacy, Henry Charles	1	1	0
Gonzaga, H. S. H. the Prince Alexander of, and Duke of Mantua	1	1	0	Lambert, Thomas	1	1	0
Gooch, Joseph H.	1	1	0	Larnach, Donald	1	1	0
Gooch, Thomas	1	1	0	Lavanchy, John R.	1	1	0
Goode, Thomas	1	1	0	Lawrence, Frederick	1	1	0
Gordon, Col. W. J., C.B., R.E., D.A.G.	1	1	0	Le Couteur, Col. John, F.R.S.	1	1	0
Gould, Charles Augustus	1	1	0	Leeks, Edward Frederick	1	1	0
Graham, Peter	1	1	0	Leighton, John, F.S.A.	1	1	0
Graham, Thomas, D.C.L., F.R.S.	1	1	0	Levi, Leone	1	1	0
Graham, William	1	1	0	Lewis, Stephen W.	1	1	0
Grant, Alexander	1	1	0	Lezard, Joseph	1	1	0
Grey, Major General the Hon. Charles	1	1	0	Linnington, A. H.	1	1	0
Grove, W. R., Q.C., F.R.S.	1	1	0	Lister, John	1	1	0
Gruneisen, Charles Lewis	1	1	0	Longstaff, G. Dixon, M.D.	1	1	0
Hack, Thomas	0	10	6	Lovegrove, James Samuel	1	1	0
Haden, F. Seymour, F.R.C.S.	1	1	0	Lovegrove, Samuel	1	1	0
Hall, Walter	1	1	0	Lowe, George, F.R.S.	1	1	0
Hamilton, Edward	1	1	0	Lucas, Thomas	1	1	0
Hamilton, Sir Robert N. C., Bart.	1	1	0	Macarthur, Major-Gen. Sir Edward, K.C.B. ...	1	1	0
Hammond, William Parker	1	1	0	MacDonald, J. C.	1	1	0
Hammond, W. Parker	1	1	0	Macfarlane, Walter	1	1	0
Hancock, James Lyne	1	1	0	Mackrell, W. T.	1	1	0
Hancock, Frederick William	1	1	0	Maclaran, George	1	1	0
Hanhart, Michael	1	1	0	Maclea, Charles G.	1	1	0
Hannay, John	0	10	6	Malcolm, Major-Gen. G. A.	1	1	0
Hannay, Robert	1	1	0	Manby, Charles, F.R.S.	1	1	0
Hannay, Robert, Junr.	0	10	6	Manchester, the Bishop of, F.R.S.	1	1	0
Hannay, Thomas	0	10	6	Marryatt, Joseph	1	1	0
Haunington, C. S.	1	1	0	Marsh, Matthew Henry, M.P.	1	1	0
Hardy, Commander R. W. H., R.N.	1	1	0	Martin, John	1	1	0
Harrison, Henry	1	1	0	Martin, Thomas	1	1	0
Harrison, Thomas E., C.E.	1	1	0	Martineau, David	1	1	0
Hawes, William	1	1	0	Martyn, Silas Edward	0	10	6
Hawkshaw, John, F.R.S.	1	1	0	Matthew, James	1	1	0
Hayward, T. Carlyle, Junr.	0	10	6	May, Harry	1	1	0
Headland, Edward	1	1	0	Mayor, Right Hon. the Lord	1	1	0
Heal, John Harris	1	1	0	McMurray, William	1	1	0
Heane, Henry	1	1	0	Mechi, Alderman	1	1	0
Heather, James	1	1	0	Merle, William Henry	1	1	0
Hereford, the Dean of	1	1	0	Metchin, W. P.	1	1	0
Heymann, Lewis	1	1	0	Middleton, David	1	1	0
Heywood, James	1	1	0	Miles, Alfred W.	1	1	0
Hick, John	1	1	0	Mocatta, Benjamin	1	1	0
Hicks, Thomas	1	1	0	Moore, Charles	0	10	6
Hill, Charles	1	1	0	Morant, Robert	1	1	0
Hollins, Michael Daintree	1	1	0	Moule, John	1	1	0
Holmes, Alfred William	1	1	0	Moulton, Stephen	1	1	0
Holmes, Herbert Mountford	1	1	0	Muir, William	0	10	6
Holmes, James	1	1	0	Mulready, William, R.A.	1	1	0
Hooper, Bartlett	1	1	0				
Hooper, George Norgate	1	1	0				

Munn, Major W. A.	1	1	0	Smith, George	1	1	0
Murchison, J. H.	1	1	0	Smith, George	1	1	0
Murchison, Sir Roderick Impey, K.C.B., D.C.L.	1	1	0	Smith, J. Scott	1	1	0
Napier, Robert	1	1	0	Smith, R. M.	1	1	0
Navroji, Dádábhai	1	1	0	Smith, T. Mosdell	1	1	0
Newcombe, S. Prout	1	1	0	Sopwith, Thomas, F.R.S.	1	1	0
Noble, Matthew	1	1	0	Spark, Henry King	1	1	0
Oastler, Jonah	1	1	0	Spicer, Henry	1	1	0
Oldershaw, Capt.	1	1	0	Spicer, William Revel	1	1	0
Owen, Professor Richard, F.R.S.	1	1	0	Stanton, George	1	1	0
Pagden, Stephen	0	10	6	Stephens, Charles	1	1	0
Pakington, Sir John S., Bart., M.P.	1	1	0	Stephens, Henry	1	1	0
Palmer, George	1	1	0	Stephenson, James	1	1	0
Paul, J. Michell	1	1	0	Stirling, Thomas	1	1	0
Pearce, Alfred B.	1	1	0	Stohwasser, Joseph	0	10	6
Peckover, Jonathan	1	1	0	Straker, John	1	1	0
Penn, John	1	1	0	Styles, Thomas	1	1	0
Petrie, Samuel	1	1	0	Sugden, Samuel	1	1	0
Pierce, William	1	1	0	Sullivan, Right Hon. Lawrence	1	1	0
Phelps, Charles	1	1	0	Symonds, Capt. R.N.	1	1	0
Phillips, Sir Thomas, F.G.S.	1	1	0	Sykes, Col. W. H., M.P., F.R.S.	1	1	0
Pitts, Samuel	1	1	0	Taylor, George	1	1	0
Platt, John	1	1	0	Taylor, John	1	1	0
Porter, Thomas	1	1	0	Tennant, James	1	1	0
Preller, C. A.	1	1	0	Teulon, Seymour	1	1	0
Price, Arthur J.	1	1	0	Thomas, John Evan, F.S.A.	1	1	0
Proctor, John	1	1	0	Tomkins, Edward	0	10	6
Provis, William Alexander	1	1	0	Tooke, William, F.R.S. (President of the Society) ..	1	1	0
Pryor, William S.	1	1	0	Trevelyan, Arthur	1	1	0
Quain, Richard, M.D.	1	1	0	Trevelyan, Sir Walter Calverley, Bart.	1	1	0
Radstock, Lord	1	1	0	Trower, G. S.	1	1	0
Ratcliff, Charles	1	1	0	Tuely, Nathaniel C.	1	1	0
Rawlinson, Robert	1	1	0	Tueski, Moritz Paul	1	1	0
Rawson, W. H. Jun.	1	1	0	Tulloch, James	1	1	0
Redgrave, Samuel	1	1	0	Turner, Benjamin Brocknell	1	1	0
Reeve, Charles	1	1	0	Turner, W. Shearman	1	1	0
Reeves, John Russell, F.R.S.	1	1	0	Twining, Thomas	1	1	0
Reid, Lestock Robert	1	1	0	Underdown, E. M.	1	1	0
Reiss, James	1	1	0	Unwin, George	0	10	0
Rennie, Sir John, F.R.S.	1	1	0	Vandoni, Le Commandeur Comte de	1	1	0
Reveley, Henry W.	0	10	0	Vane, Rev. John	1	1	0
Rivett, Joseph Cedric	1	1	0	Varley, Cornelius	0	10	6
Rixon, Alfred H.	1	1	0	Veitch, James	1	1	0
Robb, Alexander	1	1	0	Vieweg, A. J.	1	1	0
Roberts, Henry, F.S.A.	1	0	0	Walker, Sir Edward S.	1	1	0
Rodocanachi, M. E.	1	1	0	Wardell, William	1	1	0
Routledge, Thomas	1	1	0	Wass, C. Wentworth	0	10	6
Russell, Capt. G.	0	10	0	Watkins, Zachariah	1	1	0
Russell, John	1	1	0	Watney, Norman	1	1	0
Russell, John James	1	1	0	Watson, Dr. J. Forbes, M.A.	1	1	0
Russell, John Scott, F.R.S.	1	1	0	Watson, Joseph Yelloley	1	1	0
St. David's, Bishop of	1	1	0	Watson, Thomas, M.D.	1	1	0
Salisbury, the Marquis of, K.G.	1	1	0	Webb, Charles Locock	1	1	0
Salomons, Aaron	1	1	0	Webb, Henry Bellamy	1	1	0
Salomons, David	1	1	0	Webb, John	1	1	0
Salt, Titus	1	1	0	Webber, Henry	1	1	0
Sargood, F. J.	1	1	0	Whetham, Charles	1	1	0
Saul, G. T.	1	1	0	White, H. C.	1	1	0
Schneider, Richard	1	1	0	Whitfield, Henry	1	0	0
Sedgwick, John Bell	1	1	0	Willich, C. M.	1	1	0
Shearer, Bettsworth Pitt	1	1	0	Williams, Charles Wye	1	1	0
Sheriff, G. W.	1	1	0	Williams, R.	1	1	0
Shove, W. Spencer	1	1	0	Williams, Walter	1	1	0
Silthorp, Henry, A. M. W.	1	1	0	Williams, William	1	1	0
Sich, Henry	1	1	0	Wilson, G. Fergusson, F.R.S.	1	1	0
Silverlock, H.	1	1	0	Wilson, W. Newton	1	1	0
Simon, George	1	1	0	Winkworth, Thomas	1	1	0
Simpson, William Butler	1	1	0	Woodd, Basil Thomas, M.P.	1	1	0
Skey, Joseph, M.D.	1	1	0	Wood, John	1	1	0
Smart, Sir George T.	1	1	0	Wood, John	1	1	0
				Wood, Vice-Chancellor Sir W. Page	1	1	0
				Woodhouse, John Thomas	1	1	0

Woollams, Henry	1	1	0
Woolloton, Charles	1	1	0
Worms, George	1	1	0
Wright, Philip	1	1	0
Wyon, Joseph Shepherd	1	1	0
Wyon, Leonard C.	1	1	0
Yeats, John, LL.D., F.R.G.S.	1	1	0
Zachnsdorf, Joseph	0	10	6
Zetland the Earl of	1	1	0

SIXTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 25, 1863.

The Sixteenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 25th inst., Thomas King Chambers, Esq., M.D., in the chair.

The following candidates were proposed for election as members of the Society :—

Allan, William	12, Marquess-villas, Canonbury, N.
Appleby, Samuel	6, Harper-street, Red Lion-square, W.C.
Battye, Richard F., M.D.	6, Gloucester-street, Belgrave-road, S.W.
Belany, Archibald	37, Clarendon-road, Kensington-park, W.
Bennet, James Lindsay ...	2, Taviton-street, Gordon-square, W.C.
Catto, John	30, Milner-square, Islington, N., and 50, Upper Thames-street, E.C.
Lloyd, George Alfred ...	30, John-street, Bedford-row, W.C.
Muirhead, J.	Electric Telegraph Company, Gloucester-road North, Regent's park, N.W.
Parsons, John Meeson ...	6, Raymond-buildgs., Gray's-inn, W.C.
Puller, Arthur Giles	Athenaeum Club, S.W., and 14, Portland-place, W.
Rhodes, Henry	86, Cambridge-street, Pimlico, S.W.

The following Candidates were balloted for and duly elected members of the Society :—

Alcock, Thomas, M.P.	Union Club, S.W., and Kingswood Warren, Epsom.
Angel, Moses	1, King-street, Finsbury-square, E.C.
Ashton, John	10, Upper Barnsbury-st., N.
Aste, John	32, Oakley square, N.W.
Barbier, E.	9, St. Leonard's-terrace, Maida-hill, W.
Barker, George	14, Portman-square, W.
Barnard, George F.	4, Essex-court, Temple, E.C., and Cross-deep, Twickenham, S.W.
Barrass, Samuel	29, Upper Park-street, Barnsbury, N.
Barron, Frederick	8, St. Agnes-villas, Bayswater-road, W.
Bayford, Augustus F., LL.D.	52, Upper Bedford-place, W.C.
Clayton, Capt. John Wm., F.R.G.S.	14, Portman-square, W.
Hartley, T. H.	Earl-street, Horseferry-road, Westminster, S.W.
King, Charles Beeden, M.E.	20, Abingdon-street, Westminster, S.W.

Mussali, Colonel Elias { Sous Directeur au Ministère
des Affaires Étrangères de
S. A. le Bey de Tunis.

The Paper read was—

ON THE SUPPLY OF QUININE, AND THE CULTIVATION OF CHINCHONA PLANTS IN INDIA.

By CLEMENTS R. MARKHAM, F.S.A.

The supply of quinine and of other *alkaloids* derived from chinchona bark, is a subject which is well worthy of the attention of a Society such as that which has honoured me with its attention this evening; and small as my scientific attainments are, yet the active practical part I have taken in the introduction of chinchona cultivation into India, will, I trust, insure to me a favourable hearing.

That there should be a certain and largely increased supply of quinine, more especially for all tropical countries, is a point of paramount importance to the interests, not of this country alone, but of the whole civilised world. When we consider the thousands of people who have prematurely died from want of this unfailing remedy, and the thousands whose lives are now saved by its timely use, we can entertain no doubt as to the greatness and the extent of the calamity which a failure in the supply would bring with it. As a midshipman it was frequently my duty to take a boat's crew up the forest-bordered rivers of the west coast of Mexico, and I well remember the feeling of confidence which we derived from the doses of quinine administered before starting, when we saw the heavy fever-bearing mists gathering and lowering over the muddy banks. Such precautions have saved the lives of many officers and men engaged in boat service on all the tropical stations. To the use of quinine Dr. Baillie ascribes the escape of his party from the dangers of the pestiferous Niger, and in India it may be looked upon almost as a necessary of life. But, in a commercial as well as in a philanthropic point of view, the extension of the use of quinine to whole classes of people to whom it is now unattainable will be as important a result of the cultivation of chinchona plants, as the security of a constant supply to those who have hitherto enjoyed its beneficial effects.

In discussing the sources of quinine supply I propose first to cast a glance over the South American forests which now yield all the barks of commerce, and then to enter more fully on the prospects of chinchona cultivation in India and Ceylon. It will be seen, from what I shall have to say on the former portion of the subject, that the danger of the supplies of bark being checked is certainly neither remote nor imaginary.

Up to the present time the most remarkable feature in the bark trade is that no attempt worth mentioning has ever been made in South America, either to cultivate the chinchona, or to enforce any system of conservancy. On the temperate and sub tropical slopes of the cordilleras of the Andes, the genus *Chinchona* flourishes, and in no other part of the world. These healing plants are entirely confined by nature to one particular region, and it is to the certainty of possessing a close monopoly that the utter recklessness of the South Americans in their treatment of chinchona trees may be referred. The chinchona region, following the line of the cordillera of the Andes for a distance of 1,740 miles of latitude on both sides of the equator, embraces portions of four of the South American republics, namely, New Granada, Ecuador, Peru, and Bolivia; and the inhabitants of these countries have rivalled each other in their short-sighted and reckless destruction of the chinchona trees with a view to immediate profit.

It must be borne in mind, however, that this extravagant felling of trees is not confined to the South Americans, of whom I am desirous of speaking with respect, for a long acquaintance with them has convinced

me that the contemptuous tone in which they are usually spoken of here is undeserved, and that they possess many good qualities. A race which has produced a botanist such as Triana, an antiquary such as Rivero, a jurist such as Bello, a divine such as Vigil, in a single generation, and in the first generation of its separate existence, is not to be despised. If the South Americans have been regardless of the most rudimentary laws of forestry, so have the English in India until very lately. The improvident destruction of teak, black wood, and other valuable timber in the forests of India has been quite equal to the devastation in the chinchona region, and it is only within the last five years that any system of forest conservancy has been established in India at all. Englishmen, therefore, have no right to cast the first stone at South American improvidence. Having thus entered a protest in favour of my friends, I may now, with a clear conscience, proceed to touch upon their misdeeds in the chinchona forests.

Commencing our review in the northern part of the bark country, we find that wild work has been going on in New Granada for many years. Up to the year 1855 the destruction of chinchona trees of the valuable kinds called *Pitayensis* and *Lancifolia* was rapid and indiscriminate; and in that year the supplies began to fail. More recently the civil war between the ambitious Mosquera and his accomplished cousin, Arboleda, has put a stop to trade, and thus given a respite to the trees, so that small quantities of bark are again beginning to arrive from Carthagena. A period of peace and commercial activity will soon exhaust the supplies again; and, unless some system of conservancy is introduced, there will be long periods during which the supplies will entirely fail. Captain Doyle, Her Majesty's Consul at Carthagena, has promised to send me an account of the quantity of bark exported in recent years from New Granada, but I have not yet received it.

We next come to Ecuador and its once invaluable forests on the western slopes of Chimborazo and on the mountains of Loxa. Here the recklessness of the bark collectors has resulted in actual extirpation. The forests of Loxa produced the parent of all the Chinchonæ, to which Dr. Hooker has now very properly restored the original name given by Linnæus, *Chinchona officinalis*. A hundred years ago Condamine and Ulloa warned the bark collectors that they were killing the goose with the golden egg. Humboldt tells us that in his time 25,000 trees were destroyed every year, and the destruction went steadily on, until the variety first discovered by Condamine, and sent by him to Linnæus, has almost entirely disappeared. Here the destruction was more effectual than elsewhere, because the trees were not felled, but left standing deprived of their bark, in which case they are attacked by rot with extraordinary rapidity in tropical forests, hosts of insects penetrate to the stem, and the healthy roots become infected. Another variety of *Chinchona officinalis*, the bark of which still finds its way to England in the form of very small quills, is also threatened with extermination. As a large tree it has ceased to exist, and the young plants are pulled up by the roots when their bark is wanted, while the annual burning of the slopes, and the continual cropping of the young shoots by cattle assist the work of destruction. The forests of *Chinchona succirubra* or "red bark," on the western slopes of Chimborazo, have also been nearly worked out. All the large trees of this, the most valuable of the quinine-yielding species, are fast disappearing; and Mr. Spruce, who has recently been employed in that district, is of opinion that little or no red bark will be exported during the present year. In 1861 the quantity and value of bark exported from Guayaquil and Payta were as follows:—

Red bark and "West Coast Carthagena" from Guayaquil	lbs. 443,700	£ worth 17,748
Crown bark from Payta	140,000	„ 8,400
Total from the forests of Ecuador	583,700	„ 26,148

Peru, the very country which gave her name to the febrifuge chinchona bark, has now altogether ceased to supply any. So far as I have been able to ascertain, scarcely any of the grey barks of commerce from the Peruvian forests of Huanuco and Huamalis now find their way into the European markets, and all the trees of the precious *Chinchona Calisaya* of any size in Southern Peru have, by dint of remorseless felling, been entirely destroyed. I have myself struggled for days and days through the dense forests of Carabaya in search of them, and scarcely ever met one that had attained a higher altitude than my own head. Fifteen or twenty years of merciless hewing and barking have completed the ruthless work, and the beautiful crests of bright foliage and fragrant flowers, which once overtopped all the trees of the forest, have long since disappeared. It is true that bark is shipped from the Peruvian ports of Payta, Arica, and Islay, but none of it has grown in Peruvian forests.

Bolivia, whence the supplies of bark from the *Chinchona Calisaya* are derived, is also rapidly working out this source of wealth, while her legislators have their eyes wide open to the danger, and from time to time make futile attempts to avert it by restrictive laws. The calisaya species is the most highly esteemed in commerce, and, next to the "red bark," contains the largest per-centage of febrifuge alkaloids. The price is proportionally high, and the consequent eagerness of speculators to embark in this trade has been followed by a wide-spread extirpation of chinchona trees. On more than one occasion, the Bolivian government have prohibited the cutting of bark for a term of years, in order to give the forests a respite, and to bring up the price in European markets, but the decrees were never rigorously enforced, and were abrogated long before the specified periods had elapsed. Dr. Weddell informs us that, at the centre of what was formerly the chief bark collecting district, the surrounding forests are now quite cleared of chinchona trees, and that it is necessary to seek them at a distance of ten or twelve days' journey from any inhabited place. In another part of his work, the same eminent authority says:—"The forests of Bolivia, rich as they are, cannot long resist the continued attacks to which they have recently been exposed. He who, in Europe, sees these enormous and ever increasing masses of bark arrive, may, perhaps, believe that they will continue to do so; but he who sees the chinchona trees in their native forests, and knows the real truth, is obliged to think otherwise." In 1860, the quantity and value of calisaya bark exported from Islay and Arica were as follows:—

From Islay	lbs. 107,700	valued at £ 9,770
Arica	388,800	„ 35,000
Total from Bolivia	496,500	„ 44,770
Total from Ecuador	583,700	„ 26,148
	1,080,200	„ 70,918

These facts sufficiently demonstrate the precarious nature of the present supplies of bark from South America.

Of course, it will be readily understood that the danger does not consist in the actual extirpation of the chinchona genus, for this it would be beyond the power of the most industrious *cascarilleros* to effect. Numerous shoots will always continue to spring up from the old stools. But the indiscriminate destruction of all trees above the size of mere saplings will most assuredly result in the complete stoppage of the supplies of bark during several years, and at frequent intervals; while quinine will continue to be a costly luxury, and quite beyond the reach of thousands whose lives are now sacrificed from inability to procure it.

I am unable to hold out a hope that this evil can be remedied by any means that are likely to be adopted in South America itself. If the cultivation of chinchona trees were undertaken on a large scale in their own mountains; if extensive nurseries of young plants were established in the native forests of the several valuable species, and a

well matured system of forest conservancy were strictly enforced, the supplies of bark from South America would be abundant and inexhaustible. But this will never be done. As a general rule the native speculators look only to immediate profit, and even if European capital and enterprise should ever be turned in this direction, the impossibility of procuring adequate supplies of labour will present an insurmountable difficulty for many years to come.

It will, therefore, be seen that the danger of a failure in the supplies of bark from South America is imminent, while the disastrous consequences of such a failure must be patent to everyone. In India alone, an entire stoppage of quinine would be attended by the most fatal consequences, and it is not too much to say that such a calamity would be to the European what the famine of 1860-61 was to the native population.

Hence the incalculable importance of introducing the cultivation of all the valuable species of chinchona plants into India. Such a measure, if successful, would not only ensure a sufficient and unfailing supply of quinine for the use of Europeans, it would also bring this inestimable drug within the reach of the native population, and offer another promising opening for commercial speculation. When these considerations were placed before Lord Stanley, in 1859, he at once saw the importance of the measure, and it was under his auspices that it was undertaken. The management of the enterprise was entrusted to me, and, no other better qualified person having come forward, I undertook the superintendence of the collection of chinchona plants, and seeds of all the valuable species in South America, and of their introduction into India.

Before entering upon the more important portion of this paper, connected with the cultivation of the plants in India, it will be well to say a few words respecting the hard and difficult work of collecting in South America.

I resolved at once that all the valuable kinds should be introduced; that none should be collected which were not of well-established commercial value; and that the work should be completed in as short a time as possible. The two years that followed were to me a period of intense anxiety. The difficulties were immense, and at times I feared that they would be insuperable. This was not an enterprise such as the introduction of tea or coffee, or American varieties of cotton. It must be remembered that the chinchona had never been cultivated; that it grows in forests scarcely ever visited by any European; that these forests are approached by paths which skirt the edges of perpendicular precipices, pass over the region of perpetual snow, and through bleak wildernesses devoid of all resources; that the forests are for the most part so dense and closely matted, that every foot of the way must be actually hewn out, uninhabited, and fever-haunted; that the chinchona plants are so scarce, and in many instances so inconspicuous, owing to all the large trees having been felled, that it is like seeking for a needle in a bundle of hay, and that the South Americans were certain to put every possible obstacle in the way of the exportation of the plants and seeds. It was no easy matter, either, to find agents possessed of the necessary qualifications, but in this respect I was peculiarly fortunate in securing the services of such men as Mr. Spruce and Mr. Pritchett, and of the gardeners Cross and Weir. It is impossible to speak too highly of the zeal and devotion of these intrepid explorers—zeal which I may almost call disinterested, for the remuneration offered them was certainly small when compared with the vast importance of the service they performed. Mr. Spruce, too, brought to the work no ordinary acquirements as a botanist and accurate observer, and I have no hesitation in saying, that his report on the region of the “red bark” is the most valuable account of a chinchona forest that has ever appeared in Europe. It is unnecessary to dwell longer on this part of the subject. We all had to go through dangers and hardships of no ordinary character, and it must be well known that no man can wander for many days on foot in those tropical forests with impunity, and without permanent

injury to his constitution. On Mr. Spruce I am sorry to say, whose zeal in the cause of science has won him a name among botanists, the hand of disease has since pressed very heavily. Cross, a young, vigorous, and resolute man, is still in South America, on his way, I hope, to procure a supply of seeds of the valuable species of chinchona in New Granada.

I shall be excused, I trust, for making this short digression, in order to record the labours of my coadjutors. By March, 1862, the battle was fought and the victory won. In that month the last plant arrived, and all the valuable species were safely established in the Neilgherry Hills in Southern India. In addition to the plants and seeds from the forests of South America, we also received six plants of *C. Calisaya* from Sir William Hooker, who has throughout taken a deep interest in the success of the enterprise, and rendered most important assistance; a valuable plant of *C. officinalis*, var. *Condaminea*, from Mr. Howard; and some plants of *C. Calisaya*, and one of *C. lancifolia*, from the Dutch plantations in Java, in exchange for plants of the red and grey bark species. The following are the kinds now growing in the Neilgherry hills, and they embrace all that are considered valuable in commerce:—

1. *C. succirubra* (red bark), from Ecuador.
2. *C. Calisaya* (yel ow bark), from Carabaya and Bolivia.
3. *C. officinalis*, var. *Condaminea* .
var. *Bonplandiana* } (crown bark) from
var. *crispa* } Ecuador.
4. *C. nitida* }
5. *C. micrantha* } (grey bark) from Northern Peru.
6. *C. Peruviana* }
7. *Species without name* }
8. *C. lancifolia* (Carthagena bark), from New Granada.

The success of the experiment, after the arrival of the plants in India, is entirely due to Mr. Melvor, now superintendent of chinchona plantations in the Madras Presidency, whose energy, ability, high qualifications as a gardener, and extraordinary skill as a propagator, have been the means of establishing the cultivation of these precious trees on a footing which has now placed it beyond the reach of failure. The most important point, after the plants were safely introduced, was the selection of sites for their cultivation, which should be as nearly as possible equivalent in soil and temperature to their native forests, and in the performance of this duty I had the advantage of Mr. Melvor's advice and assistance.

It was necessary in the first instance to select two sites, at different elevations, one for the chinchona which inhabit very lofty situations, such as the species of the Loxa, and one of those of the Huanuco forests; and another for the “red bark” trees and the *Calisaya* species. We fixed upon a wooded ravine, well watered and with a soil consisting of rich deep loam, as the site for the loftier plantation, where the temperature exactly tallies with that of the Loxa region. It is now called the Dodabetta plantation, and is 7,600 feet above the level of the sea. The selection of the other site was a more important business, as it was to be the nucleus of the more extensive and valuable plantations. After much careful examination of various localities, we at last fixed upon a tract of forest land called Neddiwuttum, at the north-western angle of the Neilgherry hills, overlooking the table land of Wynaad. The rock on this part of the plateau is a hornblende gneiss, the heights are well watered and wooded, and the temperature corresponds with those of the red bark forests and of the forests of Carabaya. The elevation above the sea is from 6,000 down to about 4,800 feet. The only fear I felt when these sites were selected was that the amount of moisture might prove to be insufficient for the requirements of the chinchona plants, but the way in which they have weathered two dry seasons has quite dispelled all anxiety on that score.

During the first year after the introduction of the plants into India, that is from January, 1861, to January, 1862,

the operations were chiefly confined to propagating under glass. The details connected with this delicate operation, requiring so much intelligent care, are exceedingly interesting, and reflect the greatest credit on Mr. Melvor, whose unprecedented success has brought the experiment forward more rapidly than could possibly have been anticipated. His method of treatment of young seedlings and cuttings, with full and minute details respecting the proper soil, temperature, and moisture, and his way of raising plants from layers and buds, will be found in the second number of the *Journal of Botany*, edited by Dr. Seemann, which contains Mr. Melvor's able report, dated July, 1862, and several other documents on the same subject. This number should be in the hands of every one who intends to undertake chinchona cultivation, or who feels an interest in the success of the undertaking; but my time warns me that I cannot dwell longer on this very important though preliminary portion of my story.

The results of Mr. Melvor's work have been that, whereas in January, 1862, there were 8,613 chinchona plants on the Neilgherry Hills, in January, 1863, there were 127,671 plants, exclusive of many hundreds which have been forwarded from this great central dépôt to various other parts of India. I append a table (see next page), showing the monthly increase in the number of plants from June, 1861, to January, 1863.

I understand that doubts have been suggested, in certain quarters, as to the accuracy of Mr. Melvor's monthly reports on the growth and number of the plants, and that it has been hinted that both are somewhat exaggerated. With regard to the height of the plants, Sir William Denison has measured them with his own hands, and thus certified to Mr. Melvor's correctness; and as to their number, there can be no mistake, because an official list is kept, not only showing the general result, but the number in each man's charge. At the end of every month the gardeners have to send in a return of the number they have received, the number that have died, and the number that have been issued to other parties. This system was introduced not only to preserve a correct account of the number of plants, but also to enable the superintendent to judge of the relative skill of his subordinates. These facts will probably set any doubts which may exist on this point at rest.

In the spring of 1861, Mr. Melvor commenced his first experiments in planting out in the open air, and the plants thus exposed bore the cold and drought of the following dry season without any injury. Thus encouraged, the formation of a nursery at Neddiwuttum was begun in January, 1862, large enough for 300,000 plants, and 2,400 were planted out. From that time the work of planting out has progressed steadily at both the sites. Last autumn the Dodabetta site, extending over 85 acres, was in a forward state; 45 acres were in various stages of preparation, and 15 were actually planted. Here the hardy species from the forests round Loxa, the *Chinchona officinalis* of Linnaeus, is thoroughly established in its new home, and is not in the least affected by the cold and drought of the winter. At Neddiwuttum the operations are more extensive, and are thus described by Sir William Denison:—"At the top of the hill—a height of about 6,000 feet above the sea—a number of plants have been in the ground for upwards of a year. They had been exposed to the cold of the winter, the drought of the spring, and the wet of the monsoon, yet nothing could look more healthy than the whole of them. Further down the hill a piece of ground, about 68 acres in extent, had been cleared and prepared for plants; this site occupied two sides of a valley, and was sheltered by belts of trees on the ridges, separating it from adjacent valleys. About 18 acres of this were planted, and the plants looked healthy and flourishing. In another valley, at a lower level, about 180 acres had been felled and partially burnt, and below this again was the propagating house and the nursery for young plants."

At present there are 35,000 plants permanently planted

out at Neddiwuttum, and when it is considered that the average growth during last January was $3\frac{1}{2}$, and the maximum, 6 inches; it will be seen how little effect the dry and cold season has upon them, the only point respecting which I ever had any apprehension. There are to be four chinchona plantations at Neddiwuttum and Pycarrah, besides the Dodabetta site.

	Acres.
At Neddiwuttum, the two Denison plantations...	210
" the Markham plantation	200
Near Pycarrah, the Wood plantation	250
At Dodabetta, the plantation.....	85

745

and it is the intention of government to plant 150 acres annually for at least ten years, so that at the end of that time there may be a prospect of obtaining a very large harvest of quinine-yielding bark.

We now come to the great question, upon the right decision of which all success depends, namely, the method of cultivation which will ensure the largest supplies of bark in the shortest time, and the largest per-centage of alkaloids in the bark.

I must again repeat the important consideration that the chinchona was not a previously cultivated plant, respecting which all requisite information could easily be obtained—like tea, coffee, the American varieties of cotton, and other valuable products which have from time to time been introduced into India. The chinchona plants were collected in the dense unfrequented forests of the cordilleras, and the cultivator in India had everything to learn by experience and careful experiment, for unfortunately from Java, where the chinchona has been introduced for some years, there was nothing to learn and everything to avoid. Mr. Spruce, in his report, makes the following important remark:—"I have seen enough of collecting the products of the forests to convince me, that whatever vegetable substance is needful to man, he must ultimately cultivate the plant producing it;" and in doing so he must not, like the Dutch in Java, imitate the surrounding circumstances of its wild condition, by placing it in a forest under dense shade; this is not cultivation. In the forests the chinchona, like everything else, suffers more or less from overcrowding and exclusion from light and air, for in those great laboratories of nature there is a continuous struggle for life, and the weakest goes to the wall. Under cultivation these adverse influences should not be repeated but removed, and the plants should be surrounded by every artificial advantage that science or experience can suggest. Of one thing, therefore, there could be no doubt, that the chinchona plants must have plenty of light, air, and room wherein to develop their proportions, though shaded from the direct rays of the sun while young and tender.

Mr. Melvor, while strongly impressed with the absurdity of growing the plants under dense shade, saw at once that while young, they must be protected from the effects of excessive evaporation during the dry season under a bright and scorching sun, and also from the injury likely to be done by excessive radiation during cloudless nights. On the approach of the dry weather, he therefore sheltered them by rough enclosures of bamboo branches, with the leaves adhering to them, so as to give them sufficient shelter both from the effects of evaporation and radiation. The soil round the roots of the young chinchonas was also covered with one or two inches of half-decayed leaves, and, thus treated, these plants are as luxuriant as any in the propagating houses.

The next point to be decided was the way in which the harvests of bark were to be secured; whether the chinchonas should be raised as large shrubs in open ground, or as tall trees under the shade of the forest. The former alternative has been decided upon. The idea of waiting for forty years, until the chinchona had attained their full growth, before any bark could be obtained, and then destroying the trees, and having to wait another forty years for a second harvest, only requires to be stated, and it at once

MONTHLY REPORTS OF THE NUMBER AND GROWTH OF THE CHINCHONA PLANTS ON THE NEILGHERRY HILLS.

DATE.	CHINCHONA SUCCUBERA.							C. CALISAYA.	C. MICRANTHA.	C. NITIDA.	C. PERUVIANA.	Grey Bark Species, WITHOUT NAME.	GROWTH OF THE SEEDLINGS OF THE "GREY BARK" SPECIES.				CHINCHONA OFFICIALIS.			C. LANCIROLA.	C. PARUJIANA.	TOTAL NUMBER OF PLANTS.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	Number of Plants.	Average Monthly Growth.	Size of Leaves.	Maximum Monthly Growth.	Height of Tallest Plant.	Circumference of the Stems of largest Plants, near the ground.	Extreme Width through the Branches.						Average Growth.	Maximum Growth.	Size of Leaves.	Height and Breadth.	Variety Condaminia.	Variety Bonplandiana.	Variety Crispa.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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The increase would have been greater had not many plants been sent to other parts of India. In December, 1861, Chinchona plants were sent from the Neilgherry hills to form a nursery at Darjeeling—87 of *C. succubra*, and 106 of the grey bark species, besides 16 sent to Travancore. In January, 1863, 360 more plants were sent to Darjeeling, 150 to Dr. Jameson, in the North-West Provinces, and 500 to the Rajah of Travancore.

condemns itself, while to secure a continuous supply under such circumstances would require an area of chinchona forests which even India could not supply.

Under cultivation, therefore, the chinchona must be treated as shrubs yielding a yearly harvest of quill bark from their branches, by simply lopping and pruning. The plants will be benefited rather than injured by the yearly removal, before the middle of the dry season, of a certain portion of their branches. Mr. Melvor anticipates that from the sixth to the eighth year after planting, the produce will thus consist entirely of quill bark, but that after the twelfth year of the growth of the plants a large proportion will be *plancha* or flat bark. There is no danger of the plants not throwing out a sufficient number of branches, for already those only fifteen months old have eleven to thirteen, some of them $3\frac{1}{2}$ feet long. The shrubby varieties will be grown at a distance of 7 or 8 feet apart, which will give about 700 plants to the acre. The layer-grown species will be 9 to 10 feet apart, giving 500 to the acre. This will eventually be too close, but when they begin to impede each other's growth, they can be thinned out, and the operation will furnish a large supply of bark in about the twelfth year.

With regard to the quantity of quinine and other febrifuge alkaloids in quill bark, I find that the maximum yield from most of the species in a wild state is 3 per cent., and of the "red bark" kind, which predominates on the Neilgherry hills, 5 per cent. From cultivated plants, when every advantage that science or practical experience can suggest is furnished to them, a much larger yield may be expected. In gathering the bark, great care is requisite to dry it thoroughly before it is packed in bales. In the South American forests the *cascailleros* perform this operation by means of fire. They build a hut, and at a distance of about eight feet from the ground cross-beams are stretched across under the roof, on which a lattice-work of bamboos is placed. The bark is then spread out on this grating, and fires are lighted on the ground. The thin bark from the branches soon curls up into quills, and the thick *plancha* bark is turned from time to time for about three weeks. These operations will be conducted far more easily, and with more method, on our plantations; and it will probably be found advisable to manufacture quinine *in situ* at some future day. Before we leave this portion of the subject, it will be well to quote a letter from Dr. Anderson, who is in charge of the chinchona nursery at Darjeeling, by which it appears that the leaves as well as the bark possess febrifuge virtues. He says, "When the leaves of *Chinchona succirubra* fell off spontaneously in June and July, I succeeded in forming an infusion from them, which I sent to Dr. Collins, civil surgeon of Darjeeling, with a request that he would administer it to some of the patients in the hospital. He informed me that he had given the infusion, in doses of one fluid ounce, to the first four cases of intermittent fever that occurred, and that these patients had been cured without any other medicine whatever. This result proves that the infusion of the leaves of *Chinchona succirubra* possesses some of the febrifuge properties of the bark; the infusion is of a dark chocolate colour, and is intensely bitter." Dr. Anderson thinks that the healing principle in the leaves is probably kinovic acid. If this discovery should really turn out to be of importance, it will greatly increase the value of the plants, because they would begin to yield a small return in the first year or two, and long before the bark is available.

A supply both of bark and leaves from Chinchona trees grown in the Neilgherry hills is now on its way to England, and I regret very much that they did not arrive in time for me to give the results of the analysis on this occasion. I received a specimen of very young bark nearly a year ago, which was kindly analysed for me by Mr. Howard, both chemically and microscopically, and so far as so small a piece would enable him to do so, he obtained a satisfactory result. The test of sublimation showed abundance of the distinctive carmine colour indi-

cating alkaloid, and the section under the microscope showed the commencement of the chief tissues, the suberous being well developed, as is the case with the best quinine-yielding barks generally. There is another hopeful fact in connection with this small piece of bark. It was taken off a young shoot, which was immediately wrapped round with moss, and on removing the moss less than three months afterwards, the whole was again covered with new bark, quite even, and nearly as thick as that below, which had not been taken. This proves that the plants have the power of reproducing their bark, if covered and kept moist.

From the plantations on the Neilgherries plants have been sent to various parts of India; 3,000 have been established at Darjeeling, under the care of Dr. Anderson; the Rajah of Travancore has received 516; Dr. Jameson, who has done so much for the establishment of tea plantations in the Himalayas, has had 150; Mr. Cope has applied for some to be planted in the valley of Rangoo, in the Punjab; several have been sent to Professor Lees for trial in Assam; and private speculators in Bengal have applied for plants. In Ceylon, also, under the able superintendence of Mr. Thwaites, the chinchona plantations are progressing favourably, and will soon be in a position to supply the coffee planters, who are eager to undertake the cultivation, with young trees.

The advantages which the important and beneficial measure of introducing chinchona cultivation are likely to confer upon India may be considered under three heads:—1st. In their bearings in relation to the State, by providing an abundant and certain supply of bark for the use of hospitals and troops, and effecting a saving of many thousands of pounds. 2nd. As a commercial speculation, and a means of adding to the resources of the country. And, 3rd, though not least, as a boon to the people, by bringing the remedy within the reach of frequenters of jungles, and of the native population generally.

The government, by working their own plantations, will eventually save at least £20,000 a year, while they will secure a large and unfailing source of quinine supply for their own servants, the importance of which it is impossible to exaggerate. Dr. Macpherson, of Calcutta, tells us that since quinine has been extensively used among the troops in India there has been a steady diminution of mortality; and whereas, in 1830 the average per-centage of deaths to cases of fever treated was 3·66, in 1856 it was only 1 per cent in a body of 18,000 men, scattered from Peshawar to Pegu. These facts speak for themselves. The lives of hundreds of our soldiers depend upon the success of this experiment, and, in this point of view alone, the introduction of chinchona cultivation into India must be looked upon as one of the most important measures that has been sanctioned during Sir Charles Wood's administration of Indian affairs. The present governor of Madras, Sir William Denison, who has all along taken a deep interest in the experiment, is fully impressed with its importance to the government. In September, 1862, he recorded a minute, in which he entered into some calculations connected with chinchona planting. He thinks that if the lopping and pruning produce the quantity anticipated, the return will be sufficient to repay the capital expended in about ten years, inclusive of interest. The number of trees which an acre will cover is about 650, and it is calculated that each tree will produce, after ten years' growth, 5 lb. weight of bark annually. The yield per acre will thus be 3,250 lb., and for 160 acres upwards of 200 tons. At sixpence per pound, which is a very low rate, this will give £7,800 per annum as the return upon 160 acres, the annual expense of management being £1,320. This calculation refers to the Neilgherry plantations alone, and does not include Darjeeling, nor does it allow anything for those which will soon be formed in the North-West Provinces, Assam, Coorg, and the Pulneys.

We next come to the consideration of chinchona cultivation in its commercial aspect, and as a good investment

for capital. Private enterprise will be supplied with plants from the Government nurseries on the Neilgherries; 20,000 are to be sold this year, at four annas (sixpence) a-piece, and next year a much larger quantity will be available. As many as 35,000 have already been ordered by companies and private planters, and there can be no doubt that, as soon as land can be had, the demand will be almost unlimited. When it is considered that it will not cost more than two annas (threepence) to produce a pound of red bark, which is now selling at from half-a-crown to eight shillings in the London market, there is every reason to think that men of business will not overlook so promising an investment, and that the great difference between the cost of production and the value of the produce will give chinchona cultivation a good name as a safe speculation, in combination with coffee, the former beginning at the upper limit of the latter in the same clearing.

With a view to this cultivation in the hill districts, especially in the Madras Presidency, a great demand for land is sure to arise, and I will, therefore, briefly state the existing rules under which waste lands may be obtained, according to Lord Canning's resolution of October 17th, 1861, as altered by Sir Charles Wood in his despatch of July 9th, 1862. Waste lands are to be granted in perpetuity under certain rules, as heritable and transferable property, subject to no enhancement of land revenue assessment, and the land-tax may either be redeemed by a payment in full when the grant is made, or paid at a fixed annual rate. On the Neilgherry hills the coffee lands pay a tax of one rupee, and in Wynaad of two rupees an acre, levied on the third year, when the coffee first comes into bearing. The limit of time after which no previous claim that may be brought forward on the land will be valid, does not yet appear to have been finally settled. Land is in all cases to be advertised, and sold by auction to the highest bidder, or, in the event of there being no competition, to the applicant at the upset price, the cost of survey being added in both cases; and the upset price is to be regulated according to the description of land, its situation, and supposed fertility. On the 30th of August, 1862, the Bengal Government promulgated rules for the sale of waste lands according to the tenor of Sir Charles Wood's despatch, and the local rules for the Neilgherries have also been published by the Madras authorities.

The waste lands in all the hill districts of India will thus become available for tea, coffee, and chinchona cultivation, excepting such tracts as are reserved for the sake of valuable timber or fire-wood by the conservators of forests. It is not of course intended that all forests shall be reserved; and the Bengal Government has ruled that these reservations shall only include land in which teak or saul trees abound, and not tracts in which merely isolated patches of such trees are found. It must be remembered that, independent of the value of the timber, it is essential that belts of wood should be conserved, particularly along the upper courses of streams, in order to ensure the usual supplies of water, and to retain a due amount of moisture in the atmosphere. It is, therefore, the interest of all planters that a certain quantity of forest land should be retained in the vicinity of their clearings. A register of reserves for forest land, and the growth of firewood, is to be kept in the collector's offices, open to inspection.

These rules for the sale of waste lands will be especially advantageous to planters, who are desirous of obtaining clear and undisputed titles. Objections have been raised to the rule by which all land must be sold by auction, but it is really the only way of obtaining a fair price for the Government. There is more reason in the complaint that the rule by which the purchaser is not permitted to take possession until the survey is completed, will cause much loss and delay just at the very time when a beginner can least afford it. But no reasonable official is likely to require more than a preliminary survey, before possession is granted, merely in sufficient detail to insure the ready

identification of the boundaries of lots, and to ascertain their gross area.

By the rules for sales in the Neilgherries, open land is to be sold with a land tax of 1 rupee per acre, and forest of 2½ rupees; and the land tax may be redeemed at 25 years' purchase. The land is to be put up without any upset price, but subject to the above assessment, in lots of 500 acres each. All lots are to be previously demarcated, and the applicant must deposit the cost of survey. There is a great deal of good land still available for chinchona cultivation in the Neilgherries, although the demand at present is very great, and numbers of persons are anxious to embark in so promising an undertaking. Sir Charles Wood has sent out orders that every legitimate encouragement is to be extended to individuals or companies who may undertake the cultivation of fever bark, and I am sure that they will receive prompt advice and assistance from Mr. Melvor. I have already stated that several companies and private planters have undertaken chinchona cultivation in the Neilgherries and Wynaad, such as the Madras Coffee Company, whose estates are near Manantoddy, in Northern Wynaad; the Western Neilgherry Tea, Coffee, and Chinchona Company, whose estates of Maryland and Strathern are conveniently near the great source of supply, the government plantation at Neddiwuttum; and the Plantation Company of W. Hindustan. Wide fields for further cultivation of quinine-yielding bark are open in the Pulney and Anamallay hills, Coorg, Nuggur, and other parts of India. A portion of the press in India is in the habit of maintaining that the European planters can do no appreciable good to the country, but only to themselves. Paradoxical as such a theory must appear when we consider the increase of trade, the opening-up of hitherto worthless districts, the rise in the price of labour, and the consequent improved condition of the working classes, which have been caused by tea and coffee cultivation, it is absolutely false if applied to the chinchona plants. There are, I believe, several gentlemen present at this meeting who have engaged in undertakings embracing the cultivation of quinine-yielding bark, and I would impress upon them that, independent of the prospect of commercial advantages to themselves, they are conferring a direct and positive benefit upon the people of India by the raising of every chinchona plant which is put into the ground. Even those planters who do not engage in chinchona cultivation on a large scale, ought to establish a few rows of plants in the most elevated parts of their clearings, and to encourage the cultivation among the natives, from motives of humanity, and in order that the coolies, when attacked by fever, may at least have the green bark within their reach. As a commercial speculation, I have not the least doubt that the cultivation of chinchona plants will be very remunerative, far more so than tea, which requires much skilled labour, at least in Southern India. I am sure that I am expressing the views of all well wishers of India when I heartily bid God-speed to all who contemplate the cultivation of quinine-yielding plants.

Lastly, we have to consider the introduction of chinchona plants as it will affect the native population, as I think the most important, and certainly the most durable, advantage that this great measure will confer upon India. It is well-known that fever now makes fearful havoc over wide districts, especially such as are near the foot of mountain ranges, and that at present the healing chinchona bark is entirely beyond the reach of the sufferers. Before long I trust that the inhabitants of these fever-haunted districts will have supplies of bark at their own doors, or at least within easy reach. The growth of these plants should be urged upon every village, and every cultivator throughout the hill districts of India, in small gardens, or even if it be only a single tree behind a ryot's hut. For the poorer classes it will be unnecessary to go to the expense and trouble of extracting the alkaloid, because the green fresh bark is itself very efficacious. We are assured of this by that eminent German

naturalist, Dr. Poeppig. He tells us that, when attacked with violent tertian ague in the Peruvian forests, he made use of the green bark direct from the chinchona tree; and that, although, in consequence of unavoidable exposure in the rainy season, and the very great exhaustion after eight months of wild forest life, the disease returned on three occasions, it was each time conquered by the green bark within a week. He adds that, "After the first dose of this fresh and unadulterated remedy, a sensation of general well-being is felt, and after recovery, on the first excursion, one approaches the healing trees with warm feelings of gratitude." The grateful feeling of this solitary wanderer in South America will soon, we trust, be shared by millions of our Eastern brethren, to whom the fever bark has hitherto been unknown. When once its healing virtues have been experienced, and its fame has spread abroad, there will no doubt be a general desire to grow the plants, and we may anticipate that, like the peepul and the neem, it will, with more propriety, be venerated as sacred. The great Rishi and physician Aghastya, whose soul now hovers over the hills of Courtallum, will perhaps be supposed to have taken up his abode in the fever-dispelling bark tree.

Some steps will be necessary, in order to make the healing virtues of Peruvian bark known to the people, and to give the first impetus to its cultivation among them; but when this is once done, the chinchona will soon be growing in all the hill districts. So far as my observation extended, I did not find that the natives of India were slow to adopt the cultivation of a new plant, and in Coorg especially, the fine race of mountaineers who inhabit that beautiful district almost to a man had small coffee gardens behind their houses, although coffee cultivation was only introduced about seven years ago. In the case of the fever bark trees, the inducement to have them growing close at hand will be much stronger; but I would urge upon the government the advisability of offering prizes for the best chinchona gardens formed by ryots in the different hill districts, in order to give the cultivation a good start. This system of agricultural prizes has been very successful in various parts of India. In Candeish prizes were formerly given for the best horses and cattle, and recently the government have given prizes for the best cleaned cotton. Sir George Clerke, when governor of Bombay, in 1847, gave a cart and horse as a prize annually, and the system received the warmest countenance from that enlightened administrator. Dr. Buist truly observed that there were hundreds of cases in which prizes have brought into existence, and fostered through infancy, forms of industry which, without such assistance, would in many cases never have had any being at all. The offer of small prizes for the spread of chinchona cultivation would, I am convinced, be attended by the most satisfactory results.

In concluding this paper, I would once more mention the inestimable blessing which the introduction of fever bark trees has conferred upon India; and I would point to such districts, for instance, as North Canara, where the whole population is decimated by fever, and unable to procure a grain of quinine. As a work of public utility it may advantageously be compared with any that has been undertaken in India for many years—nay, more, it may with truth be said that the success of other works depends upon it in some measure. Even now the progress of the road from the port of Sedashghur to the cotton district of Dharwar, upon which so much depends, is at a stand-still, owing to the fever which rages at the foot of the hills—those hills which hereafter will be planted with fever-dispelling bark trees. In durability, too, it is equalled by no other work. Long after our roads are obliterated, our canals dried up, our masonry structures in ruins, the virtues of chinchona bark will remind the Hindu of a distant future that the strangers from the West left some blessings behind them when they finally departed from the scene of their labours and their triumphs.

DISCUSSION.

The CHAIRMAN said he would now call upon the meeting to discuss the very interesting paper which Mr. Markham had read. There seemed to him to be several portions of the subject on which many present might be able to give information to the meeting. One was as to the particular sort of chinchona plant which produced the greatest amount of quinine, as that appeared to be a matter not yet completely settled. It was quite certain that though Mr. Markham had told them that the red quality of bark produced a large per-centage of quinine—and he believed most manufacturers agreed in that—yet the yellow bark was largely used in hospitals to make decoctions and infusions. Another subject of importance was the sort of chinchona which was most easily grown, and the effects which cultivation in a climate which was not natural to that plant would have upon it. It was possible that what was now considered a very inferior variety of chinchona might, under cultivation, become the best sort in future. He thought it desirable that the experiments now making in India should be tried with as many varieties of this plant as possible. Another question which Mr. Markham had started, and which he (the Chairman) thought was important, was the influence of the prize system which the Government of India had adopted. He should like to hear the opinion of persons connected with agricultural pursuits in India, as to the probable improvement which was likely to occur from the introduction of the prize system amongst the natives of that country. He presumed the advantage of a greater supply of quinine was a matter which they need hardly discuss. Mr. Markham had spoken of the very great importance of that medicament amongst the natives of India, and medical men would agree that it was equally needed by the natives of England. The mention of one or two facts was sufficient to prove that; one was that charitable institutions (hospitals and dispensaries) were obliged, from its price, to refuse it to out-patients, and that no parish doctor could give it, so that a very large proportion of the population could not avail themselves of this valuable drug. It ought not to be regarded merely as a medicine, but was almost an article of food to those who required it. He apprehended there could be no question as to the likelihood of the improvement of this plant by cultivation, but all these matters opened fair ground for discussion, and he would now invite the opinions of those present upon these points.

Mr. GERSTENBERG had listened with great attention and interest to the able and instructive paper which had been submitted to them this evening, and he fully appreciated the successful labours of Mr. Markham. It had been stated in the paper, that in about ten years the authorities in India expected to get a return for the outlay in the cultivation of the chinchona, while he understood Mr. Markham to state previously that it took twelve years before the plants yielded quinine fit for consumption. But he that as it might, he wished to call the attention of that gentleman to the circumstance that Dr. Weddell had stated that the bark from the branches was considered to be only of half the value of that which was taken from the trunks of the trees. The consequence was the cascarrilleros went into the forests and stripped the trees of their bark from the trunk only, without taking it from the branches. Mr. Markham had alluded to the experiments made in Java, and attributed their partial failure to the planting of the trees in too shady places. He (Mr. Gerstenberg) understood from other quarters that the trees grew very well in Java, but that the yield of alkaloids was not sufficient to be remunerative as a commercial speculation. He hoped the enterprise in India would be more successful. Mr. Markham had been accompanied by Mr. Spruce, who was an excellent botanist, and also by Mr. Pritchett, and he (Mr. Gerstenberg) had every hope that their efforts would be successful. It would certainly be very unfortunate if the amount of quinine produced was not sufficient to pay the expenses.

It had been stated by Mr. Markham, that he considered it impossible to cultivate chinchona trees in South America, but Mr. Spruce had sent to this country a full account of a chinchona plantation in Ecuador, accompanied by a proposition for the formation of an English company to carry out that cultivation. Mr. Spruce had stated that there was no difficulty in getting labour there, and as the plantation was situated several thousands of feet above the level of the sea, the climate was healthy for European labourers, who might be introduced. Mr. Markham had only slightly alluded to the history of this undertaking in India, and he thought the public would be rather curious on that subject. It was stated by Mr. Markham that this subject was laid before Lord Stanley in 1859, and that he entered very warmly into it, but all the honour of carrying out the enterprise had been accorded to the administration of Sir Charles Wood. Sir William Hooker and the late Dr. Royle had used every endeavour to move the Indian Government on this subject, but without success, until Lord Stanley came into office, and he believed it was entirely owing to the quick perception and activity of that distinguished man that the enterprise had been carried out in India. He (Mr. Gerstenberg) had been introduced to his lordship by a gentleman whom Lord Stanley had himself known at Ecuador, and this afforded him an opportunity of urging the matter upon his attention. It was well known that a large tract of land had been ceded by the Republic of Ecuador to a body of gentlemen in this country, in satisfaction of a debt due to a number of British subjects, and in connection with this a company was formed, with which he (Mr. Gerstenberg) was connected. Mr. Spruce had been engaged to examine into the productive capabilities of that property, but his services had been subsequently secured by the Indian Government, and he had acted in concert with Mr. Markham, as had been mentioned in the paper. Mr. Markham had with great modesty stated the part he had borne in this enterprise. He (Mr. Gerstenberg) was surprised at the rapidity with which it had been effected. It was a mission requiring a rare combination of qualifications seldom found in one man, and he believed Mr. Markham was the best person who could have been selected to carry it out. He trusted it would turn out that the plants which had been introduced into India were the right ones, and that the climate of that country would not interfere with the quality of the quinine obtained from them, a question which he believed had yet to be solved.

Captain MUNRO said, allusion having been made by Mr. Markham to the production in the Neilgherries of tea, coffee, and chinchona, a question in which he (Captain Munro) was largely interested, he would make a few observations. The uses of quinine were so well known, and its advantages were so much appreciated in India, where he had resided for a considerable period, that no further remark need be made on that subject. He merely wished at the present moment to look at the matter in a mercantile point of view. It having been stated that these plants would not give a return for ten or twelve years, he thought people would be backward in advancing money for such a purpose. It was, however, to be recollected that any company engaged in chinchona cultivation might grow coffee at the same time, and in that way get a return while the chinchona trees were gradually coming forward. He begged to ask a question with reference to the figures given as the cost of production of this plant. He would ask whether the estimated annual expense of the 160 acres, which was stated at £1,320, included superintendence and all working expenses.

Mr. MARKHAM replied that it did.

Mr. J. E. HOWARD said he had watched this experiment with great interest from its commencement, and was happy to hear on this occasion of the measure of success that had attended it. He considered it a success, because all that Mr. Markham had stated as to the in-

valuable benefit it would confer upon the natives of India would be fully borne out, but the question of commercial advantage required to be carefully looked into before they could say that the success anticipated would be realised. As he saw several gentlemen present connected with undertakings involving the outlay of capital for the cultivation of chinchona trees, he should be happy to give all the information in his power, so as to avoid the possibility of loss by too rash speculation, as was the case in Java, from circumstances to which he need not refer, except as demonstrating that the very first thing to be considered was to get the right trees—the best species of the plant; and not only the best species, but of these species the varieties which were most productive of quinine. The calisaya species was, in his opinion, the best for producing quinine, but of this it was important to get the best variety, for the difference between one variety and another in this respect was great. He had himself obtained between five and six per cent. of quinine from the best species of calisaya bark, whilst others yielded less than one per cent. That which applied to the calisaya applied also to most of the other varieties that were worth cultivating. He made that observation especially with regard to the red bark which had been so largely introduced into India. He had stated on other occasions that it yielded the largest amount of alkaloids of any species of bark. That was the result of his own experiments with certain varieties of red bark; but it must be understood that the red bark varied from that large production of quinine he had mentioned down to a very low per centage. He had obtained 8½ per cent. of quinine from the external portion of the best variety of red bark, but this was quite an exceptional produce. There were varieties of red bark which were apparently of little or no value in the market, one of which was, he believed, derived from a variety of the *C. succirubra* called by Mr. Spruce *C. cuchicara*, or “pig’s skin,” which was a very inferior quality of bark. Before any private individuals invested largely in the plants of the *Chinchona succirubra* in India, it would be well for them to know that Mr. Spruce had obtained the best varieties of that species, especially as some of the plants varied from specimens of the best sorts sent direct to him (Mr. Howard), and described in his recently published work. The effect of change of climate was no doubt also considerable, and the results could not yet be regarded as fully ascertained. The climate most favourable to the production of alkaloids had been well described by Dr. Karsten, of Berlin, who had published a great deal of information on the subject, which might also be found in the work above alluded to. It grew in ravines high up the mountains, where there was little periodicity of growth. When they descended to tracts where the growth was more intermittent, the bark contained a considerably less amount of alkaloids, and when grown in too warm a situation, it was almost valueless. He hoped and believed that the experiment as regarded the climate of India would be successful, but it must yet be regarded as an experiment. He thought the mode of cultivation referred to would be found the best, and in that, as in all other respects, Mr. Markham had made his arrangements well, and had displayed such zeal and admirable qualities as were seldom united in one individual. He could hardly have hoped to have carried his enterprise through so successfully in the face of the immense difficulties he had had to encounter. The chinchona trees would be most valuable to the natives of India, but the question as a commercial speculation was a very different one. Quinine, as they all knew, was a very expensive medicine, and the Indian government had paid very dearly for it, seeing that the cost of that medicament was £37,000 per annum, whilst they might have obtained the same amount of febrifugal power, in the shape of muriate of chinchonine, for a very much smaller sum. Therefore he thought, as a commercial speculation, the growth of chinchonine-pro-

ducing trees would not answer, as the Government did not seem disposed to patronise this medicine. They were differently circumstanced with regard to quinine, which was almost as expensive as quinine itself, and he believed quite as good a medicine, in support of which he had the testimony of the late Dr. Royle, who administered it to his own family with the best effects. In conclusion, he would say one word with respect to the Dutch plantations of chinchona. It had been reported that they thought of rooting up all the trees of the *Chinchona Pahudiana*, in the value of which they had been greatly disappointed. Although too poor a species to be remunerative to the cultivator, he thought the bark might contain enough alkaloid to make it worth collecting now it was grown, and in this opinion he was supported by Professor Guibourt, of Paris. He would recommend them to gather the bark and send it to the markets of Europe to try the result.

Mr. THOMAS (late of the Madras Civil Service) said having been for fourteen years in charge of the district of Coimbatore and the Neilgherries, where these experiments were made, he was happy to bear his testimony to the energy and ability with which Mr. Markham had carried out this enterprise. He was there when the plants arrived and assisted in introducing them. As president of a committee who had charge of the agricultural gardens in India, he had been very much brought into connection with Mr. McIvor, whom Mr. Markham had mentioned, and he thought the work of the propagation of these plants could not have been placed in better hands. He had visited, in company with Dr. Anderson and Mr. McIvor, the different sites which had been selected for the experiments with the chinchona plants, and he could state that great pains were taken to ascertain the spots which were most likely to be suitable. They perfectly agreed with Mr. Markham's description of them, and Dr. Anderson, whom he considered to be the best Calcutta botanist, had assisted in choosing them. He would add that the system of prizes, referred to by Mr. Markham, was, in his opinion, very advantageous, and had been largely carried out in the Madras Presidency, through the medium of the collectors, in stimulating the natives to cultivate the best qualities of cotton and other commodities. It was his opinion that there would be no difficulty in acclimatising the chinchona in India, as he had himself experimented with great success upon a variety of spices which had never before been grown in that country.

Mr. SAMUEL HOWARD said there was one point connected with this question which should be borne in mind as an important one, and in which the medical man could do much good—that was by employing the much-neglected salts of chinchonine, an alkaloid at one time considered by the medical profession almost of equal value to quinine itself, as had been shown more especially by the experiments of eminent French chemists; but for many years past it appeared never to have been thought of. The consequence was, that barks yielding that article commanded a lower price in the market than those yielding quinine. The salts of chinchonine could be obtained at one-fourth the cost of quinine, and if it was an equally valuable medicine, it was a matter worthy of their attention. He would especially press upon the government the importance of trying either the sulphate or muriate of chinchonine (he should recommend the latter) as a tonic and febrifuge in India. He felt no doubt of its success, and as it might at present be obtained at a low price, they would save largely whilst waiting for the yield of these new plantations. It was still more important to make this experiment, as if it should be proved that chinchonine was not reliable as a febrifuge, though Dr. Macpherson strongly recommended it in the fevers of India, the value of all the chinchonine-producing barks would be very slight.

Mr. P. L. SIMMONDS said they had been favoured by Mr. Markham with some very interesting details on a most important subject, about which too little had been

hitherto known. Not only was the subject interesting to the Society in a scientific and commercial point of view, but it was useful to our merchants, who were the principal importers and purveyors of the bark and especially interesting to the fever-haunted countries which were the consumers of the prepared drug. The paper just read to them had already been the means of eliciting some most valuable information from two gentlemen well qualified to speak on the matter. Mr. Gerstenberg, who, from his own knowledge, had given them the history of the origin of the now successful enterprise of chinchona introduction into India, and Mr. J. E. Howard, who as the largest and almost exclusive manufacturer of quinine in this country, and the historian of the chinchona barks, had acquired a world-wide reputation, and would always, therefore, be listened to with respect and attention. It might be interesting, he thought, to furnish to the meeting some particulars calculated to show the progress of our trade in Peruvian bark. Now, tracing the statistics back for a quarter of a century, he found that the average imports in the five years ending with 1840 were 280,000 lbs. In 1845, 5,078 cwt. were received, of which 4,100 cwt. were re-exported. In 1850, the imports had increased to 10,536 cwt., and from that they gradually advanced to 27,598 cwt. in 1856, the largest quantity ever received. Since that period there had been a steady retrogression, to 21,000 cwt. in 1857, 18,000 cwt. in 1858, and 9,000 in 1860. In 1861 there was a partial recovery to 12,477 cwt., of the estimated value of £185,672. Of this, 4,663 cwt. came through New Grenada, 2,121 from Peru, and 1,035 cwt. from Chili. Now, as the whole of the bark was thrown together in the official returns, and there was no classification, it was impossible to say how much of this was fine bark and how much common, or what were the exact sources of supply yearly. Again, if we examined the statistics of the manufactured product, sulphate of quinine, we found that, in 1838, our imports of foreign made, taken for home consumption, were 101,705 ounces, and in the five subsequent years half that amount. In 1861, we imported 81,557 ounces, valued at £25,635, and exported 47,427 ounces. These figures would serve to convey an idea of the importance of the article under discussion, which created a trade whose money value amounted to a quarter of a million sterling. But, as had been well observed, it was in a hygienic point of view that an adequate supply of this bark was of so great importance. To residents in Africa, North and South America, the East and West Indies, an adequate supply of quinine was of importance, and anything which tended to increase the supply of the raw material, and bring down the price of the manufactured article, must be hailed as a boon, in a sanitary point of view, to the world at large. Already we had taken from the western to the eastern world the culture of indigo, cotton and other staples; and, notwithstanding the jealous vigilance of the Peruvians, the alpaca, one of their most treasured native animals, had been successfully introduced and acclimatised in our Australian colonies. Now we had succeeded in introducing numerous varieties of the chinchona tree into British India, and it had also been introduced into other quarters. Besides Java, it was now growing in Penang, Ceylon, and Jamaica, and it was under the care of competent cultivators and good botanists. In January last year he (Mr. Simmonds) had published in his scientific magazine, the *Technologist*, the particulars of what had been done in Ceylon and Jamaica in introducing the chinchona plant, and to that he would refer those interested in the subject for specific details. He might, however, state that Mr. Thwaites, the director of the Royal Botanic Gardens in the former island, had now about 1,000 plants growing; and Mr. Nathaniel Wilson, curator of the Botanic Gardens, Jamaica, several hundred. France, Spain, and other countries which had colonial possessions with climates and elevations suitable to the growth of the tree, would do well to turn their attention to introducing it, for it was not England alone that was interested in

this matter; the United States and France secured a very large proportion of the bark of commerce. Care should, however, be taken in choosing suitable localities, such as steep declivities or mountain tops, for Poeppig, one of the most reliable authorities on chinchona had stated, that wherever the valleys were close and warm the produce deteriorated so much in virtue as to be nearly worthless in the market. While on this subject, conjointly with our efforts to extend the cultivation of the chinchona, we should not lose sight of the desirability of discovering and testing the virtues of other febrifuge plants, for it was very doubtful whether the green bark or the prepared alkaloid would ever become so cheap or plentiful as to be brought within the reach of the poor millions of India. One of the highest medical authorities stated, that every country spontaneously furnishes remedies for those maladies which the people of the soil were naturally subject to—salicine, quassia, and many other succedanea, were all useful. Tropical jungles, moreover, abounded with plants which might be converted into useful febrifuges, and many of these had already a local reputation which should be tested without prejudice. A kind Providence had scattered in all directions the means of removing a disease which might be regarded as more or less endemic, and to the cure of which, by medicines procured on the spot, our efforts ought to be directed. But as the European pharmacopoeia afforded the necessary drugs, although at a high price, for combating the many ills to which flesh is heir, few looked beyond it for any new remedies, or for efficacious substitutes for those already in use. We were too satisfied with possessing so powerful and invaluable a remedy as the disulphate of quinine; and with the present facilities for procuring it, we felt little inclined to extend our researches with a view to discover useful native febrifuges. Dr. Lindley had well observed that "no one will be bold enough to assert that the physician already possesses the most powerful agents produced by the vegetable kingdom, for every year is bringing some new plant into notice for its energy, while others are excluded because of their inertness. In tropical countries, where a fervid sun, a humid air, and a teeming soil, give extraordinary energy to vegetable life, the natives of those regions often recognise the existence of potent herbs unknown to the European practitioner." In conclusion, he would, individually, thank Mr. Markham for his energetic and successful labours in this important field, and for the condensed account he had furnished to them relating to the habitat, produce, and attempted culture of this most important natural order of plants, accompanied as it was by much recent statistical detail not to be found in the consular reports already published.

Mr. D HANBURY expressed a hope that some gentlemen present would be able to answer the question whether there was good evidence as to the possibility of extracting alkaloids in any quantity from the bark of the young wood, as obtained from the shrubby form of tree in which Mr. Markham proposed to grow it? As far as he at present knew there was only one species of chinchona which was cut as a shrub for the sake of its bark; that was *C. condaminea*, yielding Loxa bark, which was poor in alkaloids, but when it obtained the dimensions of a tree, as it did in ancient times, the bark, he believed, was rich in alkaloids, in consequence of which it had maintained a sort of hereditary reputation.

Mr. J. E. HOWARD said the properties of the Loxa bark had been correctly stated by Mr. Hanbury, but the question was different as to the calisaya. He had seen many importations of the *Chinchona calisaya* which had been peeled from very small branches, and forming small quills, which were sufficiently rich to be very well worth working, and of a quality beyond some of the flat bark of larger trees. That was connected with the question of varieties, because in some of those cases he found that the samples were peeled from a peculiar form of the calisaya bark growing high up the mountains, and which had yet

to be introduced into India. He very much regretted that the government had not thought proper to send a steamer across to the coast of Peru to receive Mr. Markham and his precious cargo of plants upon their arrival there, as this would have been the means of saving a very large number of plants of the best varieties, which were perhaps irrecoverably lost to India.

Dr. BERTHOLD SEEMANN, having passed a considerable period of time in Ecuador, was, on his return to this country, impressed with the great importance of cultivating the chinchona trees. The neighbourhood of Loxa, once rich in these trees, was now entirely stripped of them. In long ranges of country, which formerly yielded rich harvests of bark, not a stick of chinchona was to be found. He thought the honour of the first endeavours to introduce the chinchona into India was due to the late Dr. Royle, who, though unsuccessful, strongly urged it upon the Government. In 1854, he (Dr. Seemann) took up the question in a book which he wrote, and also in articles in the *Pharmaceutical Journal*. The statement made by Mr. Gerstenberg was correct in all its details, and he believed unless Mr. Markham had taken up the question, and brought his great energy to bear upon it, the matter would never have been carried out by the Government in the way it had been. Having travelled a great deal in the region described by Mr. Markham as the scene of his researches, he could appreciate the enormous difficulties that gentleman had surmounted. He joined in the regret just expressed that a vessel was not in readiness to receive Mr. Markham and his valuable cargo, upon his having brought it safely to the Peruvian shores, through difficulties which could scarcely be described. He had every confidence that the experiment in India would be successful, and the greatest honour was due to Mr. Markham for the way in which he had carried it out. If that which was stated by Sir W. Denison was correct—and he was a good naturalist as well as a good statesman—they might expect to see the chinchona grown in India to an extent commensurate with its great importance and value to the people of that country.

The CHAIRMAN then proposed a vote of thanks to Mr. Markham for his valuable and highly interesting paper.

The vote of thanks having been passed,

Mr. MARKHAM said that he would address a few remarks to the meeting in reply to some of the statements and inquiries that had been made in the course of the discussion. With regard to Mr. Gerstenberg's account of the Ecuador Land Company, he only thought it necessary to touch upon one point, namely, the conduct which had been unjustly imputed to Mr. Spruce. That distinguished traveller, than whom a more honorable and single-minded man did not exist, had distinctly stated that he had made no engagement whatever with the Ecuador Land Company when he (Mr. Markham) secured his services, and the correctness of his statement might be implicitly relied upon. He (Mr. Markham) had not lately heard any news respecting the doings of the Ecuador Land Company, but he would be glad to find that they had commenced chinchona, or, indeed, any other cultivation. The very interesting remarks from Mr. Samuel Howard, respecting chinchonine, were particularly important in connection with bark cultivation in India, because the grey bark species had been introduced, and were likely to succeed. Mr. Markham, in reply to some remarks of Mr. Simmonds, stated the sources of information from which he had procured his accounts of the exports of bark, and he drew the attention of the meeting to the fact that many careful experiments had been made, with a view to ascertain the febrifuge efficacy of indigenous plants, such as the bonduc nut, neem bark, and the berberry, but that all investigations had ended in the conclusion that there was no febrifuge that could for a moment be compared with quinine in value. In reply to Mr. Hanbury's inquiries, Mr. Markham pointed out that the quill-bark from Loxa was procured from very small shrubs indeed, and could

not, therefore, be compared with the bark that would be obtained from the large spreading shrubs, twelve feet apart, which would be cultivated in India. He concluded by thanking the meeting for the kind way in which his paper had been received.

The Secretary announced that next week being Passion Week, the Society would not hold a Meeting; and that on Wednesday evening, the 8th April, a Paper, by Mr. Edwin P. Alexander, "On the Sewing Machine; its History and Progress," would be read.

PROPOSED INTERNATIONAL SCHOOLS.

The recent International Exhibition seems naturally to have led to the discussion, amongst the many distinguished men of different nations then in this country, of various plans for removing national prejudices.

M. Barbier, a French manufacturer, placed at the disposal of the French Committee of the International Exhibition, a sum of 5,000 francs, to be given in prizes for the best Essays on the means of establishing international education in Europe.

An international jury, of which, among others, Mr. Richard Cobden, M. Michel Chevalier, Sir James Kay Shuttleworth, and Dr. Johnson, were members, have examined the Essays, and have just published a report, which shows both the object in view and the best means of carrying it out.*

It is proposed to form a European Company, including the most distinguished men in England, France, Germany, and Italy, for the purpose of establishing a college, or rather school, in each of the four great countries of Europe.

Each of these colleges would receive children of the four nations, at an early age, in equal numbers. These children, thus living together, would very quickly teach each other their respective languages; firstly, by constant practice; secondly, by classes, which would be formed in accordance with a plan as ingenious as it is new.

The method proposed is as follows:—

To each boy a book would be given, which would contain those sentences most frequently used in conversation, expressed in the four different languages. The boys would be divided into groups of four, each group being formed of one boy from each nation. The English boy would read aloud a sentence in English, after which it would be read aloud in the same language by each of the other boys—the English boy acting the part of a teacher, and correcting their pronunciation. The French boy then assumes the part of a teacher, the other boys acting as pupils; the same sentence is read over in French, and corrected in the same manner, and so on for German and Italian. In this manner children would acquire a great many words, and when just beginning to understand and speak—which would require only a few weeks—they would every day be made to speak a different language during their play hours. The study of grammar would not begin until the children were able thoroughly to understand the professor in any of the four languages he might employ.

To make them perfect in the use of languages the different branches of education would be taught each in a different language.

At the end of every year the pupils would change colleges, and consequently the country they inhabited. But in all these colleges, the discipline, direction, and rules would be exactly alike; so that a boy going from one college to another, would be certain to find there the continuation of the studies he had begun. Relatives of

children would, besides, have the certainty that the colleges in the other countries were the exact counterpart of what they would have near them.

On the all important subject of religion, the most perfect guarantees would be provided. Effectual means would be taken to insure the most complete supervision of parents or ministers appointed by them.

It appears that distinguished men in England have taken the lead in this movement, and the system seems well worth a trial. In these colleges children of all nations could be educated together, and would learn, almost in playing, different languages, and would become acquainted, by staying in different countries, with the habits and manners of foreign nations. The time necessary for acquiring the complete knowledge of modern languages, which forms so important a branch of education, would be in a great degree saved; national prejudices and antipathies would be modified, a new generation, endowed with more liberal and enlightened views would be formed, the whole tending to the promotion of peace and social progress in the various nations.

Home Correspondence.

NAVAL CONSTRUCTION.

SIR,—The recent debates upon the construction of our war vessels evidence the uncertainty of the course that is to be pursued. I venture, therefore, upon a repetition of the opinions I have long entertained, and which I have occasionally expressed to you upon the changes in naval warfare induced by the application of steam power to nautical purposes, and which are being verified by the doings of the *Alabama*.

I do contend, as I have for many years past, that supremacy upon the ocean will mainly depend upon the speed of vessels—not upon their magnitude, structure, or heavy armament of cannon. It would, I believe, be something like certain destruction to any monster war vessel to pursue such a vessel as the Confederate rover if she were armed with submarine explosive shells in addition to her cannon, presuming that such shells are of some simple form, of easy application, properly charged, and the management of them thoroughly understood.

With regard to the speed of vessels adapted to the service of shells, they would, I think, have, in the attainment of that essential, a great advantage over vessels of ordinary form. The upper or weather deck of a shell vessel would be perfectly flush, with no bulwark above it; only stanchions and nettings to prevent those on deck from falling overboard, with weather cloths when needed; there should be nothing to hold wind that might be detrimental to speed. Shell vessels might, in addition to their principal arm, have one or two guns to bring-to a merchandise or unarmed vessel. The gun, or guns, when used for such or any other purpose, would be hoisted up from the main deck on to the upper or weather deck, and fired over all.

Vessels so completely covered in would be enabled to encounter, without risk of foundering, any amount of rough weather. Sails, under such conditions need not be used, neither would steam be required, for the vessel's bow may be kept as near to the wind as may be desired by the use of a float anchor, and, so bowing the sea, would avoid the dangers incidental to lying-to under canvas.

Shell vessels for home service should, I think, be wholly constructed of iron; while for foreign service I should, in the present difficulty of preventing corrosion and fouling of iron vessels for long periods, very much prefer wood and copper in the construction of shell vessels intended for foreign service or long cruises. Vessels on such service

* Published by Dulau, Soho-square.

would be accompanied by "a waggon train" of vessels of burden to carry supplies.

In conclusion, I would remark that the subject of submarine explosive shells is not yet generally understood, but it is, nevertheless, of great national importance, and the sooner it receives the attention of those to whom our defences are intrusted the better will it be for England.

I am, &c.,

J. HARVEY, Capt. R.N.,

5, Keynsham-place, Cheltenham, March 14th, 1863.

THE PATENT LAWS.

SIR,—In a former letter, I took the liberty of calling attention to the indiscriminate manner in which patents are granted. There is no investigation; anything, good or bad, old or new, indeed any one who can pay the fees may have a patent, so that the patent is granted to money, not to merit; indeed, it appears that all is fish that comes to the net of the Patent Office. For instance, an application is made to patent a newly invented pill, or some other kind of mixture, to be called a "Patent Medicine;" it is granted, and, as far as we know to the contrary, without having its curative qualities tested, or even its fitness for the human system, or the originality of the compound (on which alone its claims to protection should rest) certified to by competent medical authority. Now, this point affects the public in a most important degree, because thousands of people regard Royal Letters Patent as a moral guarantee of the stuff's ability to do all it generally professes to do, and that is, to cure every description of disorder that "flesh is heir to," and any mistake in this respect must not only be injurious to their own health, but detrimental to the legitimate practitioner.

It would be interesting for the public to know, and they ought to know, how the Patent Office authorities test medicinal inventions, for in such cases the utmost caution should be observed, especially as they are not manufactured by recognised practitioners—at least, I believe not—for the medical profession do not countenance such preparations. We never hear of an M.D., or an F.R.C.S., telling patients to take patent medicines, and I do not believe that they are used in the hospitals or dispensaries. Such being the facts, the following questions present themselves:—Are patent medicines the actual and original inventions of the patentees? and if so, are the inventions of such beneficial importance to the public as to entitle the inventors to the protection of the Crown? If they really possess the advantages claimed for them, why are they not used in the army, navy and general hospitals? And, on the other hand, if they are good for nothing, what right have they to a patent, which is bought only to use as an advertisement to gull the public and injure the medical profession. I am not a medical man, so what I say does not arise from any pecuniary interest in the matter. Nor have I ever been injured by patent medicines, for I never took any; but what I really mean to urge is, that before a patent is granted for a medicine, a competent medical board should certify to its originality and efficacy, and that neither the Stamp Office nor the Patent Office should be permitted to legalise quackery. I hope that these points will receive the attention of the commission now sitting.

I am, &c.,

GEORGE ELLIS.

March, 1863.

Proceedings of Institutions.

BANK OF ENGLAND LIBRARY AND LITERARY ASSOCIATION.—The thirteenth annual report states that the prosperity of the last twelve months has been fully equal to that of any previous year. The number of subscribers

for the year 1862-3 has been 484, making, with 14 life-members, a total of 498. The number of books now in the library is 9,683, 418 of which have been added during the past year; viz., 353 new volumes, 50 volumes of magazines, and 15 volumes purchased to replace worn out copies. This increase is slightly less than that reported last year, which is to be accounted for by the fact that a small part of the income of the association has been applied to opening a subscription with the "London Library Company." Early in the year it was deemed advisable to subscribe £5 5s. to that company, which course was found to be so advantageous to the association, that it was soon after determined to increase the subscription to £10 10s.; at the same time, however, decreasing that to Mudie's Library to the same amount, instead of allowing the latter to remain at £15 15s., thus making the subscription to each library £10 10s. The advantage of this arrangement is that the librarians are enabled to obtain a larger number of copies of new and popular works than they were when the subscription was confined to one establishment. The committee have purchased 86 volumes of works of permanent value and interest from Mudie's surplus stock. The committee have again thankfully to acknowledge the liberal donation of £20 from Mrs. Thwaytes through the president, and also the usual annual donation of £1 1s. from the long-continued friend of the association, I. M. Parsons, Esq. They also express their thanks to many gentlemen who have testified their interest in the success of the association by the gift of books, &c. The new catalogue of books has been completed, and is now in the hands of the members. In making this announcement they desire gratefully to acknowledge the liberality of the governors of the Bank in having allowed the catalogue to be printed in the establishment, and thereby enabled the committee to supply to the members a handsomely printed volume at a very moderate price. They also desire to express their acknowledgments to Mr. Coe, the superintendent of the printing department, for the typographical beauty of the work; to the librarians for their great zeal and care in its compilation, and to Mr. J. B. Scott for his kindness in assisting to bring so laborious a task to a successful issue. The committee draw attention to the fact that not a single book is missing from the library, although the circulation in two years has amounted to 63,000 exchanges. In conclusion, the committee record their conviction that the advantages of the association are increasingly appreciated by the subscribers, in proof of which they refer to the increased attendance in the reading-room, and to the large circulation of books, the number of exchanges during the year having amounted to about 35,000, being an average of more than 70 volumes to each member. The financial statement of the year ending 26th February, 1863, states that the receipts have been £303 13s. 5d., and that there remains a balance of £13 12s. 2d.

MEETINGS FOR THE ENSUING WEEK.

- MON. ...Actuaries, 7.
Medical, 8½. Clinical. Dr. Palfrey, "On Obstructive Dysmenorrhœa treated by Incision of the Cervix Uteri," and other communications.
Chemical, 8. Anniversary Meeting.
- TUES. ...Civil Engineers, 8. 1. Mr. Daniel Miller, "Structure in the Sea, with a Description of the Works of the New Albert Harbours at Greenock."
Royal Horticultural, 12. Floral Committee.
- WED. ...Geological, 8. Mr. James Fergusson, "On Recent Changes in the Delta of the Ganges." Communicated by the President.
Pharmaceutical, 8.
- THURS. ...Linnean, 8. 1. Mr. Blackwall, "On some Remarkable Facts in the Physiology of Spiders and Insects." 2. Mr. Murray, "Monograph of the *Mitridia*." 3. Dr. Salter, "On a Sexual Monstrosity in the genus *Passiflora*."
- FRI.Philological, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 3rd March, 1863.

- Par.
Numb.
29. Railway and Canal, &c. Bills (53. Aberystwith and Welsh Coast Railway; 54. Banff, Macduff, and Turfiff Extension Railway; Banff, Portsoy, and Strathisla Railway; 55. Barnet and Great Northern Junction Railway; 56. Bristol and North Somerset Railway; 57. Carnarvonshire Railway; 58. Cork and Youghal Railway; 59. Edinburgh and Dunfermline and Perth (North British) Railway; Edinburgh and Glasgow Railway; 60.

Delivered on 4th March, 1863.

62. Hops—Return.
55 (2). Civil Services—Estimates, Class 2.
46. Bill—Assurances Registration (Ireland).
29. Railway and Canal, &c., Bills (61. Furnace and Midland Railway; 62. Furness Railway and Barrow Harbour; 63. Great Northern Railway (Cheshire Lines); 64. Great Northern Railway (Oswton to Cottam); 65. Great North of Scotland Railway (Aberdeen Junction); 66. Guildford and Leatherhead Railway; 67. Hemel Hempstead and London and North Western Railway; 68. Hoylake Railway; 69. Inverness and Aberdeen Junction Railway; 70. Kendal and Ulverstone Junction Railway; 71. Launceston and South Devon Railway; Leominster and Kington Railway; 72. Letterkenny Railway)—Board of Trade Reports.

Delivered on 5th March, 1863.

72. Army Estimates, 1863 64—Paper.
83. Navy (Advantages of Iron and Wood in the construction of Ships)—Statement.
77. Durham University—Return.
45. Bill—Admiralty Court (Ireland).
Poland—Correspondence in 1856.
29. Railway and Canal, &c., Bills (73. Llanelly Railway and Dock; 74. London and Epsom Downs Railway; 75. London and Brighton and South Coast Railway (Dorking to Leatherhead); 76. London and Brighton and South Coast Railway (Extensions and Alterations, &c.); 77. Metropolitan, Tottenham, and Hampstead Railway; 78. Midland Railway (Extension to London), Mangotsfield to Bath; 79. Milford Railway; 80. Milford Haven Dock and Railway; 81. Montrose and Bervie Railway; 82. North Eastern Railway (Hull and Doncaster Branch); 83. Norwich and Spalding Railway (Powers to Great Northern Railway Company) (Wisbeach Extension); 84. Peterborough, Wisbeach, and Sutton Railway; 85. St. Ives and West Cornwall Junction Railway; 86. Seaton and Beer Railway; 87. Somerset Coal Railway; 88. South Yorkshire Railway; 89. South Yorkshire Railway (Hull Extension); 90. South Yorkshire Railway and River Dunn (Transfer, &c.); 89. Tending Hundred Railway; 90. Victoria Station and Pimlico Railway)—Board of Trade Reports.

Delivered on 6th March, 1863.

- 45 (1). Trade and Navigation Accounts (31st January, 1863).
65. Duchy of Lancaster—Account.
75. Poor Law (Patrick Bourke)—Return.
47. Bill—Metropolis Turnpike Roads Acts Amendment.
Brazil—Further Correspondence.
Canada (Militia Bills)—Copies or Extracts of Correspondence.
29. Railway and Canal, &c., Bills (91. Whitehaven, Cleator, and Egremont Railway; 92. Working Dock; 93. Brecon and Merthyr Tydfil Junction Railway; 94. Brecon Junction Railway; 95. Buckley Railway; 96. Busby Railway; 97. Cork and Kinsale Junction Railway; 98. Devon Valley Railway; 99. Drayton Junction Railway; 100. Dungarvan Harbour, Markets, and Improvement; 101. Hayling Railways (Abandonment); 102. Holbeach North Junction Railway)—Board of Trade Reports.

Delivered on 7th and 9th March, 1863.

- 50 (2). Railway and Canal Bills—Third Report from the General Committee.
84. Salmon Fisheries (England and Wales)—Second Annual Report of the Inspectors.
50. Bills—Gardens in Towns Protection.
51. „ Hares (Ireland).
52. „ Burials.

Delivered on 10th and 11th March, 1863.

42. Bed of the Sea, &c.—Return.
48. Woods, Forests, and Land Revenues—Abstract Accounts.
58. Army (Artillery Officers)—Returns.
74. Dulwich College—Returns.
78. Pier and Harbour Act—Board of Trade Report.
79. Coals (Woolwich and Portsmouth)—Return.
82. Hainault and Epping Forests—Return.
85. Army—Return.
86. Navy (Iron-cased Batteries)—Return.
41. Bills—Diseases Prevention (Metropolis).
53. „ English Church Services in Wales.
54. „ Bakehouses Regulation.
55. „ Naval Coast Volunteers Act Amendment.
56. „ Tobacco Duties (amended) (P. M.).
China—Further Papers relating to the Rebellion.
29. Railway and Canal, &c., Bills (103. Inverness and Perth Junction and Perth and Dunkeld Railway Companies; 104. Inverness and Perth Junction Railway; 105. Knighton and Central

Wales Railway Companies; 106. London, Brighton and South Coast Railway (South London, Tooting, &c., Junction Railway); 107. London, Chatham, and Dover Railway (No. 2); 108. London, Tilbury, and Southend Railway; 109. Ogmore Valley Railways; 110. Sidmouth and Budleigh Salterton Railway; 111. Teign Valley Railway; 112. Uxbridge and Rickmansworth Railway; 113. Watford and Rickmansworth Railway; 114. West Cork Railway; 115. West Drayton, Staines, and Woking Junction Railway; 116. Wimbledon and Streatham Railway; 117. Isle of Purbeck Railway; 118. Isle of Wight Railway Extensions; 119. Landport and Southsea Tramway; 120. London and North Western and Lancashire and Yorkshire Railway Companies; 121. Londonderry Railway (Seaham to Sunderland); 122. Marshland Smeeth and Fen District Drainage; 123. Newhaven Harbour and Ouse Lower Navigation; 124. Penarth Harbour, Dock, and Railway)—Board of Trade Reports.

Delivered on 12th March, 1863.

29. Railway and Canal, &c. Bills (125. Wexford and Enniscorthy Railway); Board of Trade Report.
73. Army (Distinguished Service Colonels)—Return.
49. Bill—Borough Residence Measurement.

Delivered on 13th March, 1863.

55. (6). Civil Services—Estimates (Class iv).
88. Licensed Victuallers—Return.
90. Army (Extra Receipts)—Return.
91. Army (War Department)—Return.
92. Malt Licensing—Return.
North America—Correspondence relating to the Civil War, No. 1.
North America—Correspondence with Mr. Mason, No. 2.
North America—Correspondence respecting the "Alabama," No. 3.

Delivered on the 14th and 16th of March, 1863.

76. East India (Public Work Department)—Returns.
93. Fortifications Loan Act—Return.
96. Change of Name—Copies of Correspondence.
71. Metropolitan Police—Accounts.
57. Bills—Telegraphs (amended on re-commitment).
58. Bills—Inclosure.
59. Trustees (Scotland) Act Amendment.
Poland—Correspondence.
29. Railway and Canal, &c., Bills—(127. Bristol Docks; 128. Bristol and Fortishead Pier and Railway; 129. Bristol Port and Channel Docks; 130. Bristol Railways Junction Railways; 131. Cardiff and Caerphilly Railway; 132. Colne Valley and Halstead Railway; 133. Glasgow and South Western and Ayr and Maybole Junction Railway; 134. Great Western (Branch at Great Bridge) Railway; Greenock and Wemyss Bay Railway; 135. Lancaster Canal and London and North Western Railway; 136. Manchester and Milford Railway; 137. New Milford Docks; 138. Southampton and Netley Railway; 139. Wear Navigation and Sunderland Docks);—Board of Trade Reports.

Delivered on 17th March, 1863.

89. Great Yarmouth Battery—Return.
19. Metropolitan Board of Works—Report.
104. Poor Law (Patrick Brophy)—Return.
39. Bills—Marriages Registration (Ireland).
60. Bills—Borough Residence Uniform Measurement.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

*[From Gazette, March 20th, 1863.]**Dated 11th February, 1863.*

378. H. Wycherley, Oldbury, Worcestershire—Certain imp. in the construction of and mode of applying wings or dirt screens over the wheels of carriages.

Dated 13th February, 1863.

386. S. M. Innes, Hill-house hill, Millbrook, Hampshire—Imp. in the construction of pianofortes.

Dated 14th February, 1863.

397. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in lever horse power machines, the cog gearing employed being applicable to other machines. (A com.)
399. J. C. Jeffcott, Anglesey street, Cork, Ireland—Imp. in the production and generation of gases, and also in apparatus connected therewith.

Dated 19th February, 1863.

453. W. Sherwood, Birmingham—An imp. or imps. in wine glasses.
455. R. Pinkney, 18, Bread-street-hill—Imp. in the manufacture of metallic pens.
457. W. Trustrum, 2, Marlborough-road, Old Kent-road—Imp. in the manufacture of oiled silk.

Dated 20th February, 1863.

459. H. B. Barlow, Manchester—Certain imp. in weaving, and in the machinery employed therein. (A com.)
461. W. Marsden, 49, Old Bailey—Imp. in buttons and other similar fastenings, and in the modes of attaching or securing the same.

463. J. Bentley and H. Booth, Pilkington, Lancashire—Imp. in looms for weaving.
465. W. Hainsworth, Rothwell, near Wakefield, Yorkshire—Imp. in the manufacture of cast iron pipes, columns, or any description of tubing.
467. W. Clark, 53, Chancery-lane—An imp. in boilers for disintegrating and pulping vegetable substances. (A com.)
469. F. W. Bennndorf, Chemnitz, Saxony, Germany—Imp. in governors or apparatus for regulating the speed of steam engines or other engines for driving machinery.

Dated 21st February, 1863.

471. C. Malpas, Soho Mills, Tunstall, Staffordshire—Imp. in ovens or kilns for firing, burning or baking pottery, bricks, tiles, and other earthen or ceramic articles.
473. H. Kilshaw, Haslingden, Lancashire, and T. Elce, jun., Manchester—Certain imp. in machinery for preparing and doubling cotton and other fibrous substances.
475. E. T. Hughes, 123, Chancery-lane—Imp. in the treatment of colouring matters derived from tar for the purpose of making them applicable for painting. (A com.)
477. A. H. Remond, 4, Moorgate-street—Imp. in preserving provisions, and in the apparatus employed for such purpose.
479. W. Wood, Monkhill, near Pontefract, Yorkshire—Imp. in the process of manufacturing pomfret or liquorice cakes, rolls, sticks, and pipes, and other similar articles of confectionery.
481. J. Brown, Sheffield—Imp. in the manufacture of armour plates for ships and other structures. (A com.)
483. W. E. Newton, 66, Chancery-lane—Imp. in the construction of wind instruments of music. (A com.)

Dated 23rd February, 1863.

485. W. H. Gauntlett, Middlesbro'-on-Tees—Imp. in apparatus for heating the blast in the manufacture of iron.
487. J. Eckersley, Westhoughton, Lancashire—Imp. in spinning and doubling silk.
489. J. P. F. Datchy, Margaret-street—Imp. in steam engines.
491. R. Martindale, Birmingham—Imp. in lamps and burners, and in apparatus employed for milling or ornamenting parts of lamps, which apparatus may also be applied to other similar uses.
493. T. Dickens, A. L. Dickens, and H. Heywood, Middleton, Lancashire—Imp. in ornamenting plush and other such textile fabrics.
495. J. Erwood, 91, Goswell-street—Imp. in producing imitation gilding on paper hangings and other surfaces, also in metal leaf and metallic or bronze powder suitable for the purpose.

Dated 24th February, 1863.

497. D. Spink, Spaxton, near Bridgewater, Somersetshire—Imp. in the construction and arrangement of armour plates for ships.
498. W. Whithead, H. Whitehead, and H. Barber, Sheffield—Imp. in the manufacture and securing of cutlery handles, and machinery employed therein.
501. G. Davies, 1, Serle-street, Lincoln's-inn—An imp. in melting and smelting furnaces. (A com.)
505. W. Hooper, Mitcham, Surrey—Imp. in insulating and protecting telegraphic and other wires and rods, and in machinery connected therewith.
507. E. R. Walker, Haigh, near Wigan, Lancashire—Imp. in valves, and in apparatus connected therewith.
509. G. A. Huddart, Brynkr, Carnarvon—Improved means of imparting heat to fluids.
511. T. Mallinson and J. Livingston, Manchester—Imp. in throstle spinning and doubling frames, wholly or partly applicable to roving and slubbing frames.
513. G. Bower and W. Hollinshead, St. Neot's—Imp. in apparatus for the production and transmission of gas or other fluids.
515. W. H. Laphorn, Broad-street, Portsmouth—Imp. in reefing and furling ships' square sails.

Dated 25th February, 1863.

517. F. A. Gatty, Accrington—Imp. in printing and dyeing cotton and other fabrics.
518. R. Maynard, Whittlesford, Cambridgeshire—Imp. in portable chaff cutting machines.
519. R. A. Brooman, 166, Fleet-street—Imp. in lamps for burning petroleum and other similar oils, and in feeders or cans for supplying such oils to lamps. (A com.)
521. W. Headman, Glasgow—Imp. in the manufacture of carbonate of magnesia, and of iodine and kelp salt, and other products from kelp.
523. J. B. Green, Hayle Mill, Maidstone—Imp. in the manufacture of paper.
525. J. Gailey, Princes-street, Chelsea—Imp. in apparatus for the purpose of supplying air for mixture with gases and other aeriform fluids.
527. H. H. Henson, 13, Parliament-street, Westminster—Imp. in mats.
529. W. E. Newton, 66, Chancery-lane—Imp. in producing stereotype plates for printing purposes. (A com.)
531. N. Thompson, Abbey-gardens, St. John's Wood—Imp. in machinery for sawing wood.
533. A. Macivor, Edinburgh University—Imp. in veneering or over-laying woods according to two methods, 1st, by means of steam exhaustion or steam pressure, or air exhaustion or air pressure; 2ndly, by the employment of electro-magnetism.

Dated 26th February, 1863.

537. C. Ritchie, South-street, Finsbury Market—An improved machine for making spiral lighters or spills from wood or other

substance, and which machine will make and colour them when desired at one process or operation.

539. W. A. Wilson and J. Smith, Liverpool—Imp. in furnace fire-grates.
541. A. P. Price, 47, Lincoln's-inn-fields—Imp. in the production and manufacture of blue colours. (A com.)
543. P. Spence, Newton Heath, Manchester—Imp. in the manufacture of potash, alum, and other salts of potash.
545. M. Puddefoot, Blisset-street, Greenwich—Imp. in implements for tilling and cultivating land.
547. R. J. Nodder, Liverpool—Imp. applicable to hats, caps, helmets, military head dresses, and other like coverings for the head.

Dated 27th February, 1863.

549. J. H. Albinson and H. H. Cocker, Bolton—Imp. in spinning, doubling, throwing, and reeling silk, and in the machinery employed therein.
552. E. T. Hughes, 123, Chancery-lane—Imp. in machinery or apparatus for doubling or twisting yarn, thread, braid, rope, or similar articles. (A com.)
553. J. Carver, Nottingham—Imp. in the arrangement or fixing of combs in machines employed in the manufacture of bobbin net or twist lace.
555. J. Fry, Chesham, Buckinghamshire—Imp. in mashing machinery used in making fermented liquors.
558. William Gray, Sheffield—Imp. in the manufacture of beaters for thrashing machines.
559. W. Clark, 53, Chancery-lane—Imp. in pumping and forcing water, and in apparatus for the same. (A com.)
561. J. H. Johnson, 47, Lincoln's inn fields—Imp. in machinery or apparatus employed in the preparation or treatment of hemp and other textile materials. (A com.)

Dated 28th February, 1863.

562. B. West, 2, St. James's-walk, Clerkenwell—An imp. or imps. in metallic pens.
563. G. Royle, 32, King-street, Cheshire—A new or improved apparatus for creasing or marking rouches.
564. W. Hadfield, Lotton—Imp. in steam boilers, and in the arrangement of flues in connection therewith.
565. J. W. Friend, Freemantle, Southampton—An improved gas-meter.
567. J. Maxfield, Warrington, Lancashire—Certain imp. in brewing, and in apparatus employed therein.
568. S. Williamson, Sheffield—Imp. in the construction of furnaces.
569. D. Collinge, Oldham—Imp. in machinery or apparatus for cleaning, steaming, and preparing cotton or other fibrous materials to be spun.
570. E. Paine, Liverpool—Improved apparatus for facilitating the cleaning of ves-el's bottoms while afloat.
571. T. E. Symonds, Adam-street, Adelphi—Imp. in the construction of screw propelled ships, and in the arrangement and mode of disconnecting, with drawing and lifting screw propellers.
572. J. Penn, Greenwich—Imp. in escape or relief valves to the cylinders of marine and other steam engines.
573. J. Courtenay 9, Down-street, Piccadilly—Imp. in obtaining motive power. (A com.)
574. E. Hayes, Stoney Stratford, Buckinghamshire—Imp. in supplying water to surface condensers of marine engines.
575. S. Bateman, Low Moor, near Bradford—Imp. in the manufacture of wire rope and cordage, and in the machinery employed therein.
576. G. Haseltine, 12, Southampton-buildings, Chancery-lane—Imp. in sewing machines. (A com.)

Dated 2nd March, 1863.

577. O. Murrell, Bethnal-green-road—Improved arrangements for generating steam in steam boilers and other vessels, and for heating the liquid contents thereof.
578. F. Tolhausen, 17, Faubourg Montmartre, Paris—Imp. in cloth blankets and other fabrics, to be used in machinery for printing fabrics, paper hangings, and letter press. (A com.)
579. J. W. Burton, Leeds—An improved mode of refining and purifying oils.
581. G. Hawksley, Sheffield, and T. Bissell, 75, Tooley-street—Imp. in powder chargers.
582. E. Habel and E. Suckow, Manchester—Certain imp. in machinery or apparatus for preparing, spinning, and doubling cotton and other fibrous substances.
583. T. Taylor, 7, Wellington row, Bethnal-green—The manufacture of a new or improved fabric, and its application to the formation of ornaments for fire-stoves and other decorative purposes.
584. C. Garton, Bristol—An improved method of applying heat in the manufacture and refining of sugar, and in malting, hop drying, brewing, distilling, and vinegar making.
585. J. S. Wells, Mount-street, Nottingham—Imp. in the manufacture of stockings and other looped fabrics made in knitting machines.

Dated 3rd March, 1863.

587. T. E. Symonds, Adam-street—Imp. in the apparatus for steering ships.
588. T. Emmott, Vale Mills, Oldham—Certain imp. in mules for spinning and doubling.
589. R. Saunders, Croydon—Imp. in metal sheathing for ships and vessels, and in the securing of such sheathing thereto.
590. G. F. Lyster, Liverpool—Imp. in mooring buoys.

591. R. H. Jones and J. Abrahall, Birmingham—Imp. in bracelets and brooches.
592. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in polishing or giving a lustre to soap, and in the apparatus employed in such process. (A com.)
593. J. Henderson, Bradford—Imp. in machinery or apparatus for the manufacture of carpets and other piled fabrics.
595. J. Sibert, Nottingham—Imp. in apparatus for winding and measuring lace.
596. G. Lamb, 9, America-square, Minorities—Imp. in apparatus for recording the revolutions of the propelling shaft of a steam ship or vessel.
597. T. Erich, 77, Newgate-street—Imp. in machinery for pressing peat. (A com.)
598. D. B. Parsons, 77, Upper Thames-street—Imp. in reaping and mowing machines. (Partly a com.)
599. B. S. Cohen, 9, Magdalen-row, Great Prescott-street, Goodman's-fields—Imp. in apparatus for protecting the points of pencils.
600. W. Parsons, Earl-street, Edgware-road—Imp. in dining tables.

Dated 4th March, 1863.

602. C. M. Palmer and J. McIntyre, Jarrow, Durham—An improved mode of applying and fastening metal sheathing to the bottoms of iron ships or vessels, and to iron for other uses.
606. T. H. Morrell, Leyland, Lancashire, and J. Williamson, Willcross, Gisburn, Yorkshire—A new or improved method of purifying the noxious vapours or gases given off from night soil or other similar substances during the heating, drying, or evaporating of such substances.
607. E. A. Wunsch, Glasgow—Imp. in treating sea-weed, and in apparatus therefor.
610. E. W. Binney, 40, Cross-street, Manchester—An improved lamp burner. (A com.)
611. W. Clark, 53, Chancery lane—Imp. in the manufacture of sulphuric acid, and in apparatus for the same. (A com.)
612. W. Hamilton, 13, Paternoster-row—Imp. in means or apparatus for registering suitable for advertisers' purposes.
613. J. Craig, Weston-park, Shipston-on-Stour, Worcestershire—Imp. in apparatus for detecting and detaining thieves, and indicating the presence of fire.
614. W. L. Tizard, Birmingham—Imp. in manufacturing curved armour plates and other iron work, and in machinery or apparatus employed therein.

Dated 5th March, 1863.

615. W. Whittle, Smethwick, Staffordshire—Imp. in machinery for the manufacture of nails.
616. T. Thornton, E. Thornton, and R. Thornton, Elland, Yorkshire—Imp. in machinery or apparatus for preparing wool or other fibrous substances for spinning.
617. J. Clinton, 35, Percy-street, Tottenham-court-road—Imp. in the construction of flutes.
618. W. Allen, Cheadle, and W. Johnson, Newton Moor, Chester—Certain imp. in machinery or apparatus for grinding "cards" employed in carding engines.
619. R. D. Dwyer, Manchester—Certain imp. in springs to be employed in the manufacture of beds, seats, or for similar purposes where an elastic surface is required.
621. W. Wells, Ryder's-court, Leicester-square—Imp. in horse-shoes and in the method of fastening the same.
623. S. H. Foster, T. Bunney, and J. Anderson, Leicester—Imp. in means or apparatus for the manufacture of looped fabrics.
624. J. Miller, Uxwey, near Dorchester—Imp. in horticultural building and other glazed structures, part of which imp. is also applicable to ventilated other buildings.
625. E. B. Wilson, 5, Parliament-street, Westminster—An imp. or imps. in the manufacture of steel, and in the apparatus employed therein.
627. J. Howie, Hurlford, Ayr, N.B.—Imp. in the construction of the crossings of railways.
630. C. Clay, Walton-grange, Wakefield—Imp. in chain harrows.
631. J. Morris and T. Newton, 200, Upper Thames-street—An imp. or imps. in refrigerators and other like articles.
632. W. H. Buckland, Barge-yard—Imp. in the mode of and in the apparatus for producing gas for illuminating or heating purposes, parts of which imps. are also applicable for increasing the illuminating and heating power of ordinary lighting gas.

Dated 6th March, 1863.

633. M. Jourdin, Manchester—Imp. in machinery for engraving by means of electricity.
634. A. Cuthell, Skerton, Lancashire—Imp. in self-acting dampers for steam engine furnaces.
635. A. W. Makinson, Westminster—Imp. in locomotive and stationary engines.
638. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of illuminating gas, and in apparatus employed therein. (A com.)
639. D. W. Ransom, 24, Pembroke-place, Liverpool—Imp. in fixing artificial teeth.
640. T. Hancock, Birchwood, near Alfreton, Derbyshire—An improved receptacle for gold and silver or other coins.
642. T. G. Webb, Manchester—Imp. in the manufacture of articles of pressed glass.
643. A. V. Newton, 66, Chancery-lane—An improved construction of elastic carriage wheel. (A com.)

644. W. E. Newton, 66, Chancery-lane—Imp. in the construction of metal csks, and in the machinery employed in the manufacture thereof. (A com.)

Dated 9th March, 1863.

646. R. Mushet, Coleford, Gloucestershire—An imp. in the manufacture or treatment of pig or cast iron.
650. J. Haworth, Manchester—Imp. in breaks for omnibuses and other carriages.
652. W. Inglis, Edinburgh—Imp. in steam boilers and engines.
656. J. R. Gorst, Liverpool—Imp. in carriages.

Dated 11th March, 1863.

662. R. A. Brooman, 166, Fleet street—Imp. in voltaic belts and bandages. (A com.)
664. G. A. Fulton and J. Clyde, Stepney—Imp. in dry gas meters.
666. H. Wilson, Watling-street—Imp. in machinery for shaping wood.
668. A. Barclay, Kilmarnock, Ayr, N.B.—Imp. in locomotive boring and winding engines.
670. J. Werge, 379, Oxford-street—Imp. in apparatus for indicating any regulated maximum or minimum degree of temperature. (A com.)
672. J. Renshaw, Manchester—Imp. in machinery for dressing, raising, and brushing silk and cotton velvets, velvetens, cords, plushes, and other piled fabrics.

Dated 12th March, 1863.

674. F. B. Krauhaar, 2, Thavies-inn, Holborn—Imp. in apparatus for winding, cleaning, measuring, sorting, doubling, throwing, and reeling silk, parts of which imps. are also applicable to like machinery for spinning, doubling, and twisting cotton, wool, and other fibrous materials.

INVENTION WITH COMPLETE SPECIFICATION FILED.

678. E. H. Lomas, Rodney-wharf, Church road, Battersea—Imp. in the action of charger or measure for powder flasks, canisters, or other vessels.—12th March, 1863.

PATENTS SEALED.

[From Gazette, March 20th, 1863.]

March 20th.	
2593. T. Knowles, J. Houghton, W. Knowles, and W. Houghton.	2617. J. Eardley.
2595. W. Dobson.	2618. W. Lea.
2597. R. A. Brooman.	2623. T. R. Harding.
2604. R. A. Brooman.	2625. J. J. Bates.
2614. F. Tolhausen.	2629. W. E. Gedge.
2615. J. Raywood.	2635. J. C. Pruvost-Bauchart.
2616. J. K. Leach and E. B. P. Smith.	2643. H. Hirsch.
	2646. H. Hellis.
	2657. P. G. Van der Ryl.
	2661. W. C. Cambridge.
	2663. W. H. Ward.

[From Gazette, March 24th, 1863.]

March 21st.	
2334. S. J. Paris and W. Bate.	2854. J. Turnbull.
March 24th.	
2640. W. B. Lord and F. H. Gilbert.	3101. R. Beck.
2648. R. A. Brooman.	3167. J. Moule.
2683. J. E. Billups.	3366. W. Tongue.
2695. D. Lowe.	3478. W. Richards.
2703. J. Heap.	37. H. Bessemer.
2747. T. Bouch.	68. A. Guild.
2810. E. Lord.	114. H. Bessemer.
2849. T. Greenwood.	151. J. Lightfoot.
	217. W. Allen and W. Johnson.
	220. M. A. F. Mennons.
	300. C. Smithies & C. L. Smithies.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, March 24th, 1863.]

<i>March 19th.</i>		1041. R. Seager.
728. J. Brown.		1915. R. A. Brooman.
741. W. Turner.		<i>March 20th.</i>
742. G. Crawshaw.		988. C. F. Sebillie.
759. B. Cooper.		<i>March 21st.</i>
763. G. K. Snow.		761. S. C. Lister.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, March 24th, 1863.]

<i>March 16th.</i>	<i>March 21st.</i>
850. A. C. L. Devaux.	680. H. Brierley.
1097. A. C. L. Devaux.	